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Review of the genus *Libnetis* from China with descriptions of several species from Thailand (Coleoptera: Lycidae)

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Abstract. Chinese and some Thai species of *Libnetis* Waterhouse, 1878 are treated. Nine new species are described: *Libnetis chinensis* sp. n., *L. fodingshanensis* sp. n., *L. edentatus* sp. n., *L. yunnanensis* sp. n. all from China, and *L. chuangdaoensis* sp. n., *L. kubani* sp. n., *L. machongsongensis* sp. n., *L. mayeri* sp. n., *L. soppongensis* sp. n. all from Thailand. *L. birmanensis* Kleine, 1928 is recorded from China for the first time. A key to Chinese *Libnetis* is provided.

Taxonomy, new species, key, distribution, Lycidae, Platerodinae, Libnetini, Palearctic Region, Oriental Region

INTRODUCTION

Libnetis Waterhouse, 1878 is the most numerous genus of Libnetini that comprises over 50 species. Its range of distribution is predominantly confined to the Oriental Region, however it also occurs in the southeast part of the Palearctic region – Japan, Taiwan, China (Fujian, Guizhou, Shaanxi, Sichuan, Yunnan, etc.), and in the Himalayas (N Myanmar, Sikkim, Nepal, N India).

Pic (1911, 1917, 1921) and Kleine (1926, 1928) described most species of the genus *Libnetis*. Later it was Kasantsev (1993, 1997), who dealt with its species from south east Asia. Yet, only one species of *Libnetis* has been known from China and three species have been recorded from Thailand so far. Other species are known from Vietnam.

Libnetis comprises predominantly small species without strong pronotal carinae, only slight median longitudinal carina present anteriorly. Its elytra bear only primary costae, secondary costae and reticulate cells are absent. Most of the species of *Libnetis* are very similar in external characters. As male genitalia of *Libnetis* are strongly diversified, the taxonomy of the genus is predominantly based on male genital characters. Unfortunately, the association of males and females is not possible unless collected in copula, and therefore the identification of females is mostly impossible.

MATERIAL AND METHODS

Specimens were examined using a Zeiss Technival stereoscopic microscope, with the magnification up to 125×, and illustrated using either the drawing tube or the ocular microgrid.

All measurements are in millimetres. The eye diameters were measured in lateral view at the widest point, interocular distances from above at the narrowest point. Male genitalia were dissected after having been boiled in 10% KOH solution.

ABBREVIATIONS

BMNH – Natural History Museum, London, U.K.
 ZMPA – Zoological Institute and Museum, Warszawa, Poland
 ZPMK – Museum Alexander Koenig, Bonn, Germany
 NHMB – Naturhistorisches Museum, Basel, Switzerland
 HHNM – Hungarian Natural History Museum, Budapest, Hungary
 NMIC – National Museum, Praha, Czech Republic
 LMBC – author's collection

SYSTEMATIC PART

Libnetis Waterhouse, 1878

Libnetis Waterhouse, 1878: 104 (type species: *Libnetis pumilio* Waterhouse, 1878, by monotypy)

Libnetomimus Kleine, 1927: Bocakova, in press (type species: *L. setosus* Kleine, 1927, original designation)

TYPE MATERIAL EXAMINED: Syntype of *Libnetis pumilio*, female (BMNH), Ceylon, Thwaites (bearing Waterhouse's label male), paralectotype, female, the same data (BMNH). Holotype of *Libnetomimus setosus* Kleine, male, "Luzon, Mt. Makiling, Baker" (ZMPA).

DIAGNOSIS. Small beetles, antennae filiform, with long antennomere 3, mouthparts usually weakly prolonged, mandibles shortly arcuate to triangularly reduced. Elytra flat, each elytron with 4 longitudinal costae, secondary costae and reticulate cells absent, male genitalia with shortened parameres, ventrally fused.

DESCRIPTION. Body dark brown or yellow. Head mostly with large eyes, eye diameter as long as or longer than interocular distance. Antennae filiform in both sexes, one of antennomeres 4–7 sometimes provided with a short lamella. Antennae reaching elytral midlength, antennal tubercles conspicuous, antennomere 3 long, usually longer than $\frac{3}{4}$ of antennomere 4. Mouthparts rather elongate, labrum transverse to square, mandibles reduced, arcuate to trianguloid. Maxillary palpi long, 4-segmented, labial palpi short, 3-segmented. Terminal palpomeres of both palpi either apically pointed, or provided with distal papillae. Pronotum more or less trapezoidal, transverse, widest at basal margin, anterior margin slightly produced forwards, sides elevated. Anterior portion of pronotum strongly punctured. Median longitudinal line channelled at base, forming a small longitudinal areola. Posterior angles acute, projected obliquely backwards. Scutellum with shallow arcuate apical notch. Elytra elongate, subparallel-sided, 2.6–3.3 times longer than humeral width, slightly wider than pronotum. Each elytron with 4 weak costae, secondary costae and reticulate cells absent. Mesosternum strongly transverse. Male terminal sternum provided with proximal enlargements to which projections of tergum 9 are attached. Female terminal sternum provided with two short projections proximally. Male genitalia with short phallobase, parameres shortened, ventrobasally fused, usually as long as half of phallus. Female genitalia short, coxites medially emarginate, valvifers basally widened, these enlargements ventromedially approached. Body length: 3.4–5.3 mm; humeral width: 1.0–1.6 mm.

DISTRIBUTION. Bali, Borneo, S China, India, Java, Laos, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Sumatra, Taiwan, Thailand, Vietnam.

Key to Chinese species of the genus *Libnetis* – males

1. Eyes large, 1.8 times longer than interocular distance, terminal palpomeres of both maxillary and labial palpi almost pointed apically *Libnetis chinensis* sp. n.
- Eye diameter as long as interocular distance, terminal palpomeres of both maxillary and labial palpi securiform, provided with distal projections (Fig. 27). 2

- 2. Small species under 4 mm, phallus apically emarginate (Fig. 17) *Libnetis yunnanensis* sp. n.
- Species over 4 mm, phallus rounded distally 3
- 3. Ventral portion of parameres long, fused only in basal half, phallus ventroapically broad (Figs 5, 6), provided with small lateral thorns *Libnetis jodingshanensis* sp. n.
- Phallus slender, ventral portions of parameres short and entirely fused (Figs 1, 7) 4
- 4. Phallus dorsoventrally flattened, provided with a stout lateral thorn on each side (Figs 1, 2) *Libnetis birmanensis* Kleine
- Lateral thorns of phallus absent (Figs 7, 8) *Libnetis edentatus* sp. n.

1. Review of *Libnetis* from China

Libnetis chinensis sp. n.

(Figs 3, 4, 22, 28)

TYPE MATERIAL. Holotype, male, "China, W Guizhou prov., Leigongshan, Xijiang, 1200–1900m, 29 May–2 Jun 1997" (LMBC). Paratypes: 6 males, 1 female, the same data (HNHM, LMBC).

ETYMOLOGY. Named in reference to the range of distribution.

DIAGNOSIS. Pronotum strongly trapezoidal, eyes extremely large, mandibles reduced, terminal palpomeres of both maxillary and labial palpi apically pointed, parameres ventrally fused. Closely related to *L. purpureocularis* Kasantsev, 1993 (Thailand) from which it differs in having brown eyes and deeper emargination of ventrodistal parameres margin.

DESCRIPTION. Body dark brown to black. Eyes very large, eye diameter 1.8 times longer than interocular distance, antennae filiform, reaching elytral midlength, antennomere 2 as long as 3, rather bent. Mouthparts strongly prolonged anteriorly, mandibles reduced, trianguloid, labrum as long as wide, maxillary palpi elongate, 4-segmented, labial palpi 3-segmented, terminal palpomeres of both palpi almost pointed distally. Pronotum trapezoidal, slightly transverse, widest at base, anterior margin strongly produced forwards, lateral margins strongly diverging posteriorly (Fig. 28). Scutellum widened anteriorly, emarginate apically. Elytra elongate, 3 times as long as humeral width. Each elytron with 4 costae, secondary costae and reticulate cells absent. Sutural margins of elytra contiguous in anterior half, gradually remote posteriorly, mesosternum transverse. Distal margin of abdominal sternum 8 almost straight, male sternum 9 elongate, strongly proximally widened, tergum 9 strongly triangularly emarginate. Legs rather slender, compressed. Phallus strongly dorsoventrally flattened, provided with very small lateral thorns. Parameres almost pointed dorsodistally, ventral portion of parameres widely fused, ventrodistal margin of parameres distinctly emarginate. Female terminal sternum provided with two short projections. Body length: 4.4–4.9 mm, humeral width: 1.05–1.25 mm.

REMARK. The holotype will be deposited in NMPC.

Libnetis birmanensis Kleine, 1928

(Figs 1, 2, 21, 27, 29)

TYPE MATERIAL. Lectotype, male, "Burmah, Ruby, M^o, Doherty" (BMNH).

FURTHER MATERIAL EXAMINED. 3 males. China, W Guizhou prov., Leigongshan, Xijiang, 1200–1900m, 29 May–2 Jun 1997 (LMBC).

DIAGNOSIS. Related to *L. flavostriatus* Kasantsev, 1993 (Vietnam), from which it differs in having whole body black, slenderer parameres, and in the shape of internal sac of phallus.

DESCRIPTION. Whole body dark brown to black. Eyes large, eye diameter 1.45 times longer than interocular distance, antennae filiform, reaching elytral midlength, basal antennomeres as figured (Fig. 21), antennomere 3 weakly shorter than 4. Mandibles short, arcuate, labrum transverse, maxil-

lary palpi short, 4-segmented, terminal palpomere slightly securiform. Labial palpi 3-segmented. Terminal palpomeres of both palpi provided with distal papillae (Fig. 27). Pronotum trapezoidal, transverse, widest at basal margin, anterior margin weakly produced forwards, sides elevated, posterior angles acute. Scutellum apically emarginate. Elytra elongate, slightly widened backwards, 3.1 times as long as humeral width, rather wider than pronotum. Each elytron with 4 costae, secondary costae and reticulate cells absent, intercostal areas punctured. Distal margin of abdominal sternum 8 almost straight, male sternum 9 elongate, widened proximally but not fused with ventroproximal projections of tergum 9. Legs slender, compressed, tibiae straight, their spurs small, slender and acute, tarsomeres 2–4 lobed, trochanters elongate. Phallus ventrodistally curved, slender, provided with a strong lateral thorn on each side medially, parameres slightly shorter than half of phallus. Body length 4.7–5.6 mm, humeral width 1.2–1.5 mm.

***Libnetis fodingshanensis* sp. n.**

(Figs 5, 6, 23, 30)

TYPE MATERIAL. Holotype, male, "China: E Guizhou prov., Fodingshan, Ganshi, 25 km S of Shiquan, 1300 m, 5–9 Jun 1997" (LMBC). Paratypes: 1 female, the same data (LMBC), China: S Shaanxi, 15 km SW Dongguangkou, 1700 m, 14–17 Jul 1998, 1 male (LMBC).

ETYMOLOGY. Named in reference to the type locality.

DIAGNOSIS. Related to *L. birmanensis* from which it differs in having much smaller eyes, stouter phallus, and partial ventral fusion of parameres.

DESCRIPTION. Whole body dark brown to black. Eyes large, eye diameter as long as interocular distance, antennae filiform, reaching elytral midlength. Mandibles small, arcuate, labrum strongly transverse, maxillary palpi long, terminal palpomeres of both maxillary and labial palpi provided with projections of distal papillae. Pronotum almost oblong, transverse, negligibly widened posteriorly, anterior margin almost straight, weakly produced forwards, sides elevated, posterior angles acute. Scutellum slightly widened anteriorly, provided with shallow arcuate apical notch. Elytra elongate, subparallel-sided, about 2.8 times as long as humeral width. Each elytron with 4 primary costae, secondary costae and reticulate cells absent. Distal margin of abdominal sternum 8 almost straight, male sternum 9 elongate, weakly widened anteriorly, tergum 9 moderately triangularly emarginate. Legs rather slender, compressed, tibiae straight, trochanters elongate. Female terminal sternum provided with two short projections. Phallus broad, provided with short, stout, ventrolateral thorns. Parameres rounded distally, partly fused ventrally. Female terminal sternum provided with two short projections. Body length 4.1–4.7 mm, humeral width 1.1–1.3 mm.

REMARK. The holotype and paratypes will be deposited in NMPC.

***Libnetis edentatus* sp. n.**

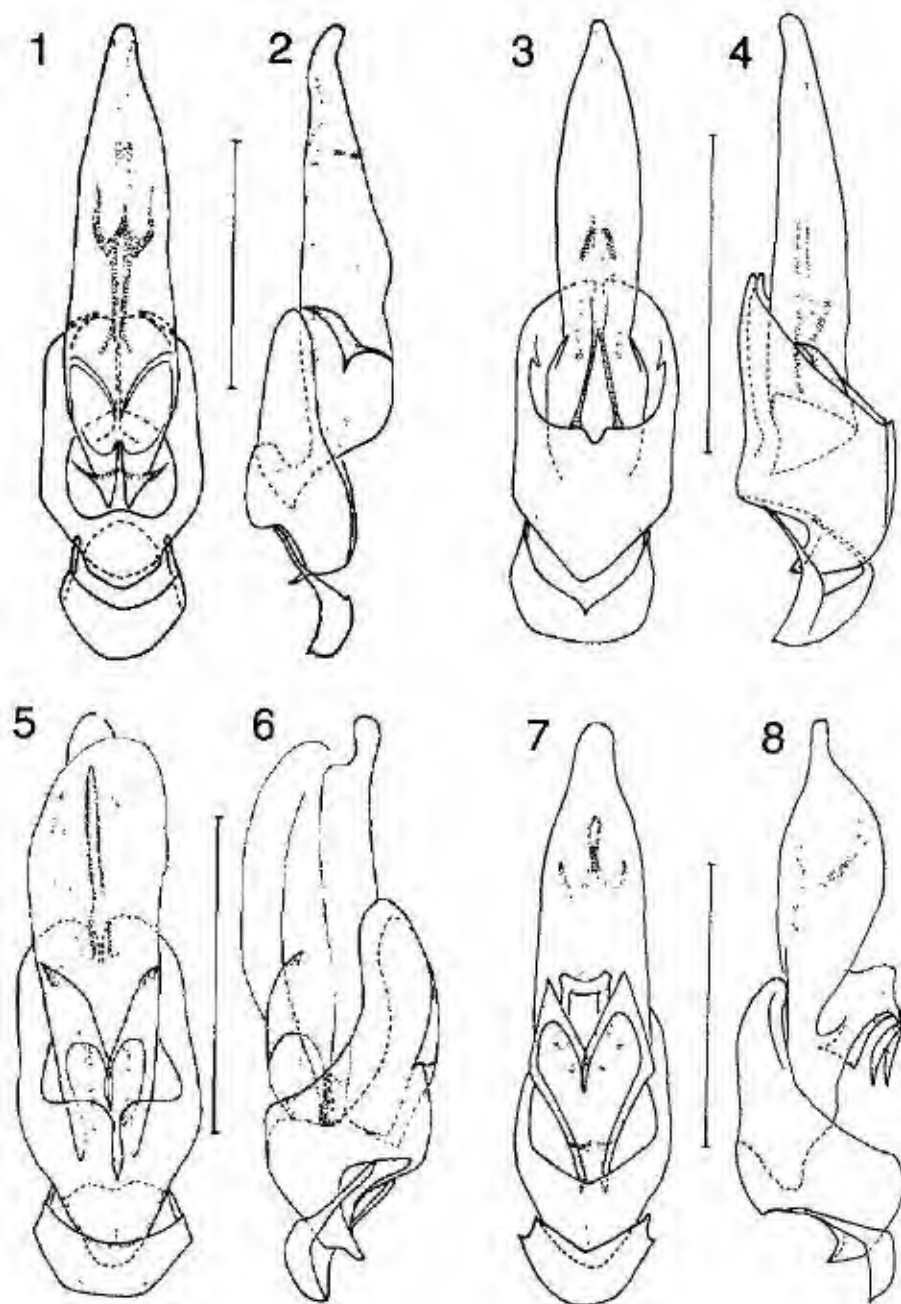
(Figs 7, 8, 24, 31)

TYPE MATERIAL. Holotype, male, "China, W Guizhou prov., Leigongshan, Xijiang, 1200–1900 m, 29 May–2 Jun 1997" (LMBC).

ETYMOLOGY. Named in accordance with the shape of aedeagus having no lateral thorns.

DIAGNOSIS. It differs from *L. fodingshanensis* sp. n. in having slenderer phallus, strongly constricted in apical $1/10$.

DESCRIPTION. Whole body dark brown to black. Eyes large, eye diameter as long as interocular distance, antennae more or less filiform, weakly serrate, reaching elytral midlength. Mandibles small, arcuate, labrum transverse, maxillary palpi long, with terminal palpomere provided with distal



Figs 1-8. Male genitalia in ventral and lateral view 1, 2 - *Libinia birmanensis* Kleine, 3, 4 - *L. chinensis* sp. n.; 5, 6 - *L. fodingshanensis* sp. n., 7, 8 - *L. edentatus* sp. n. Scale - 0.5 mm.

projections of papillae. Pronotum oblong, strongly transverse (Fig. 31), widest at basal margin, anterior margin almost straight, sides emarginate medially, posterior angles acute. Scutellum oblong, emarginate distally. Elytra elongate, subparallel-sided, about 3 times as long as humeral width, slightly wider than pronotum. Each elytron only with 4 primary costae. Distal margin of abdominal sternum 8 almost straight, male sternum 9 elongate, strongly widened distally, tergum 9 conspicuously triangularly emarginate. Legs rather slender, compressed. Phallus broad provided with ventromedial projections, lateral thorns absent. Parameres rounded distally. Female unknown. Body length 4.3 mm, humeral width 1.2 mm.

REMARK. The holotype will be deposited in NMPC.

***Libnetis yunnanensis* sp. n.**

(Figs 17, 18, 25, 32)

TYPE MATERIAL. Holotype, male, "Yunnan, Gaoligong mts., 1500–2500m, 25°22'N 98°49'E, 17–24 V 1995" (LMBC).

ETYMOLOGY. Named in reference to the type locality.

DIAGNOSIS. Considerably small species, phallus strongly ventrobasally curved, provided with several thorns medially.

DESCRIPTION. Whole body black. Eyes large, eye diameter as long as interocular distance, antennae filiform, reaching elytral midlength. Mandibles short, arcuate, labrum transverse, maxillary palpi long, with terminal palpomere provided with projections of distal papillae. Pronotum more or less oblong, transverse, widest at basal margin, anterior margin straight, lateral margins emarginate, elevated, posterior angles acute. Pronotum with two lateral depressions medially (each at proper lateral margin). Scutellum weakly widened anteriorly, apically emarginate. Elytra elongate, slightly widened posteriorly, wider than pronotum, about 2.8 times as long as humeral width. Each elytron with 4 primary costae, secondary costae absent, mesosternum transverse. Male sternum 9 elongate, tergum 9 triangularly emarginate proximally. Legs slender, compressed. Phallus slender, ventromedially curved, parameres apically rounded. Body length 3.6 mm, humeral width 1.0 mm. Female unknown.

REMARK. The holotype will be deposited in NMPC.

***Libnetis sinica* Kasantsev et Yang, 1999**

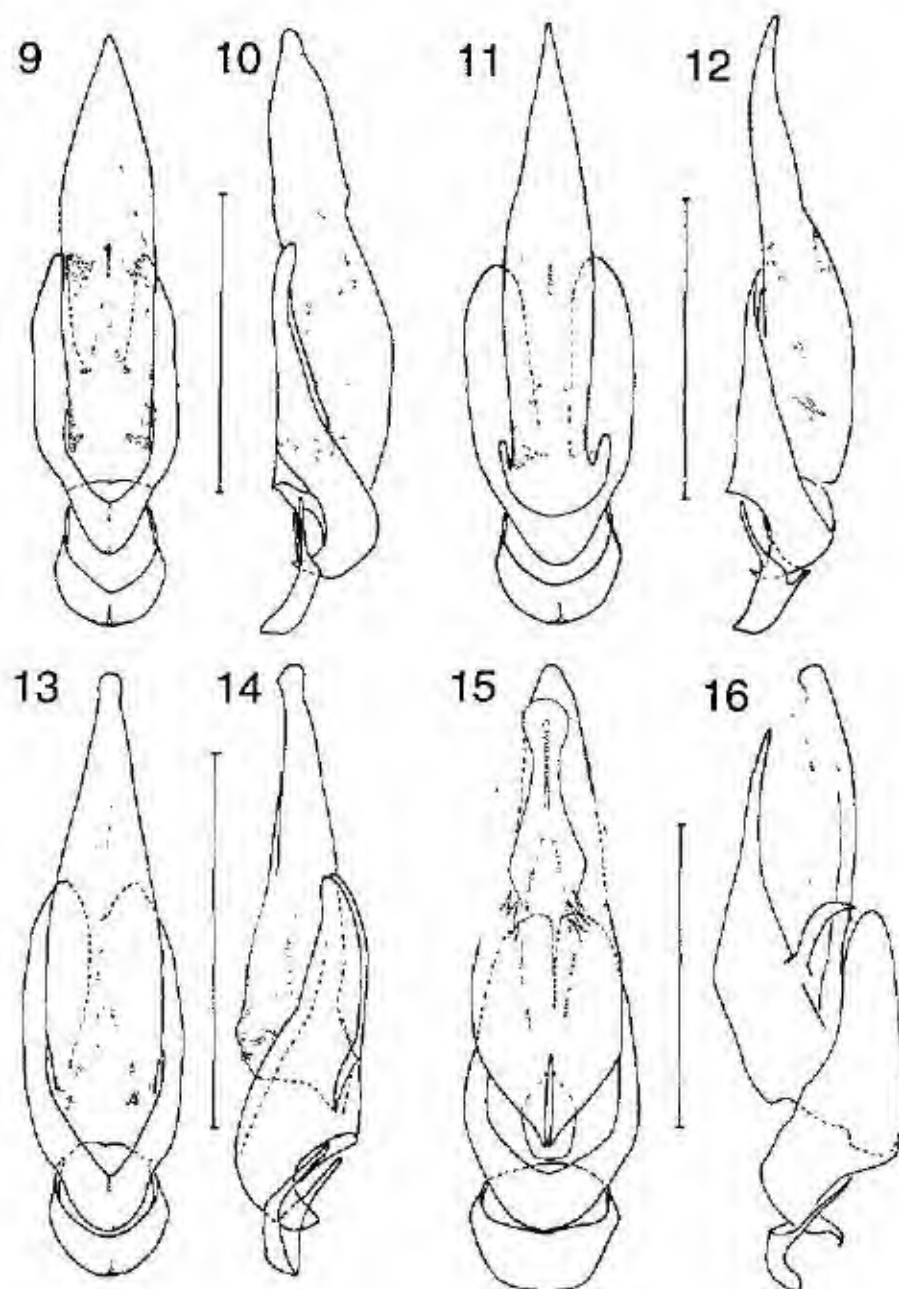
Libnetis sinica Kasantsev et Yang, 1999: 243.

Plateros tenebrans Kleine, 1950: 22.

Libnetis tenebrans Bocakova, 1997: 190.

TYPE MATERIAL. Holotype, female, "Kurtan (Fukien), 2300 m, 27°40' N Br., 117°40' E, 2 VI 1938, leg. J. Klappenich" (ZFMK).

REMARK. Kasantsev & Yang (1999) proposed new name *Libnetis sinica* for the preoccupied *Plateros tenebrans* Kleine, 1950. Unfortunately, the holotype of *Plateros tenebrans* Kleine, 1950 (which became the holotype of *Libnetis sinica*) is a female, while other *Libnetis* species are based on males, and therefore it remains species inquirenda.



Figs 9-16 Male genitalia in ventral and lateral view 9, 10 - *Libinia kubani* sp. n., 11, 12 - *L. maehongsongensis* sp. n., 13, 14 - *L. majeri* sp. n., 15, 16 - *L. chiangdaoensis* sp. n. Scale - 0.5 mm.

2. New *Libnetis* species from Thailand

Libnetis chiangdaoensis sp. n.

(Figs 15, 16, 35)

TYPE MATERIAL. Holotype, male, "Thai, Chiang Dao, 1000 m, 19° 25'N, 98° 52'E, 17.-24.v.1991, Vít Kubaň leg." (LMBC).

ETYMOLOGY. Named in the reference to the type locality.

DIAGNOSIS. Related to *L. flavostriatus* and *L. birmanensis*. *Libnetis chiangdaoensis* sp. n. differs from the former in having longer and slenderer parameres, stouter phallus, and in yellow coloration of scutellum and outer areas of pronotum. It differs from *L. birmanensis* in the shape of phallus (Figs 1, 2).

DESCRIPTION. Body dark brown, only pronotum (except discal area) and scutellum yellow. Head with large eyes, eye diameter as long as interocular distance. Antennae reaching over elytral midlength, more or less filiform, antennomeres 6–10 weakly serrate. Mandibles short, arcuate, labrum transverse, medially emarginate. Maxillary palpi long, with terminal palpomeres provided with 7–9 distal papillae, labial palpi short. Pronotum trapezoidal, transverse, widest at basal margin, anterior margin produced forwards, strongly elevated medially, lateral margins almost straight, slightly divergent posteriorly. Pronotum strongly punctured, discal area smooth. Scutellum triangularly emarginate apically, mesosternum strongly transverse. Elytra elongate, subparallel-sided, about 3 times longer than humeral width, 1.2 times wider than pronotum. Elytra detached in posterior half, each elytron with 4 weak costae. Legs slender, compressed, tibiae straight, their spurs acute, trochanters elongate. Parameres as long as half of phallus, dorsally attached to each other, phallus provided with a curved lateral thorn on both sides medially (Fig. 16). Body length: 4.0 mm, humeral width: 1.1 mm. Female unknown.

REMARK. The holotype will be deposited in NMPC.

Libnetis soppongensis sp. n.

(Figs 19, 20, 36)

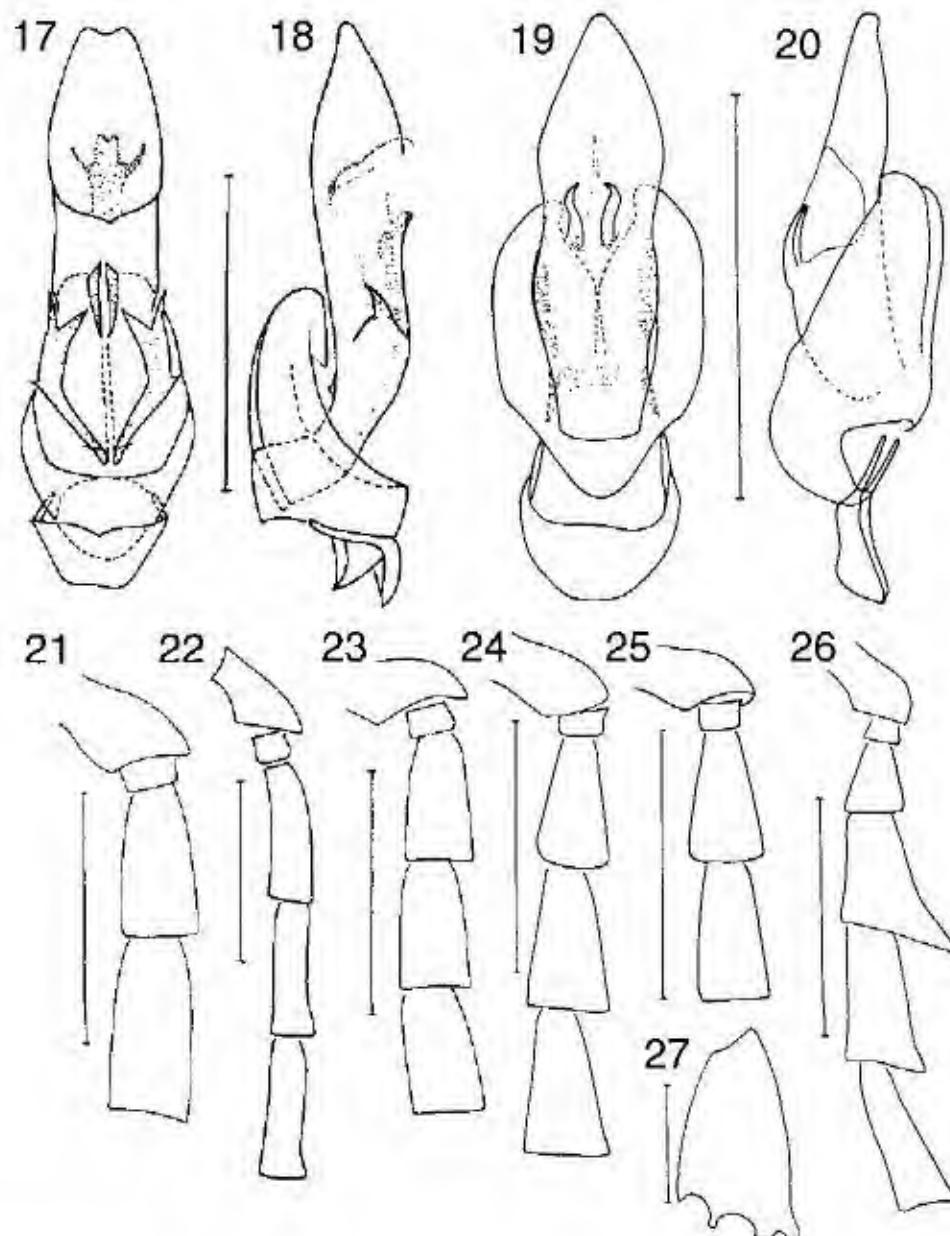
TYPE MATERIAL. Holotype, male, "Thai, Soppong, 750 m, 19.29N 98.18E, 13. 5. 1993, L. Bocák leg." (LMBC).

ETYMOLOGY. Named in reference to the type locality.

DIAGNOSIS. It differs from all known *Libnetis* in having stout and long parameres and in phallus provided with two hooked thorns, shifted ventrally.

DESCRIPTION. Whole body dark brown to black. Head with slightly prominent eyes, interocular distance 1.15 times longer than eye diameter, antennae filiform. Mandibles strongly reduced, only their trianguloid remnants present, labrum as long as wide, more or less square, maxillary palpi long. Terminal palpomeres of both maxillary and labial palpi strongly diminishing apically, without distal papillae. Pronotum trapezoidal, transverse, widest at base, anterior margin weakly produced forwards, lateral margins almost straight, slightly convergent forwards, posterior angles acute, scutellum apically emarginate. Elytra elongate, subparallel-sided, 2.9 times longer than humeral width, and 1.25 times wider than pronotum. Each elytron with 4 weak costae, elytra mutually detached in distal half, mesosternum strongly transverse. Legs slender, compressed, tibial spurs small, acute. Parameres stout, longer than half of phallus, dorsal margins of parameres apically emarginate. Phallus provided with two hooked ventromedial thorns. Body length: 3.6 mm, humeral width: 0.96 mm. Female unknown.

REMARK. Whole left antenna and right antennomeres 5–11 of the holotype missing. The holotype will be deposited in NMPC.



Figs 17-27. 17-20 - male genitalia in ventral and lateral view. 17, 18 - *Libnetis yunnanensis* sp. n.; 19, 20 - *L. soppoensis* sp. n.; 21-26 - basal antennomeres. 21 - *L. birmanensis* Kleino; 22 - *L. chinensis* sp. n.; 23 - *L. fadingshanensis* sp. n.; 24 - *L. edentatus* sp. n.; 25 - *L. yunnanensis* sp. n.; 26 - *L. majeri* sp. n.; 27 - terminal maxillary palpomere of *L. birmanensis* Kleino. Scale (Figs 17-26) - 0.5 mm, scale (Fig. 27) - 0.25 mm.

Libnetis machongsongensis sp. n.
(Figs 11, 12, 34)

TYPE MATERIAL. Holotype, male, "NW Thailand, Mae Hong Song, Ban Si Lang, 1200 m, 23–31.5.1991, J. Horák leg." (LMBC)

ETYMOLOGY. Named in reference to the type locality.

DIAGNOSIS. Related to *L. purpureiocularis* and *L. chinensis* from which it differs in having short ventral portion of parameres, phallus without small lateral thorns.

DESCRIPTION. Body dark brown, lateral belts of pronotum yellow. Head with large eyes, eye diameter 1.4 times longer than interocular distance, antennae filiform, reaching over elytral midlength, antennomere 4 is 1.1 times longer than 3. Mandibles short, arcuate, labrum transverse, oblong, maxillary palpi long, terminal palpomeres of both maxillary and labial palpi almost pointed apically. Pronotum transverse, oblong, posterior angles small, slightly prominent obliquely backwards, anterior margin weakly produced forwards, sides elevated. Scutellum with arcuate emargination apically. Elytra elongate, weakly widened posteriorly, about 3.2 times as long as humeral width and 1.15 times wider than pronotum. Each elytron with 4 weak costae, mesosternum more or less transverse, slightly trapezoidal. Legs slender, compressed, tibiae straight, their spurs acute, trochanters long. Phallus dorsoventrally curved in apical portion, parameres slender, detached dorsally. Body length: 3.7 mm, humeral width: 1.0 mm. Female unknown.

REMARK. The holotype will be deposited in NMPC.

Libnetis majeri sp. n.
(Figs 13, 14, 26, 37)

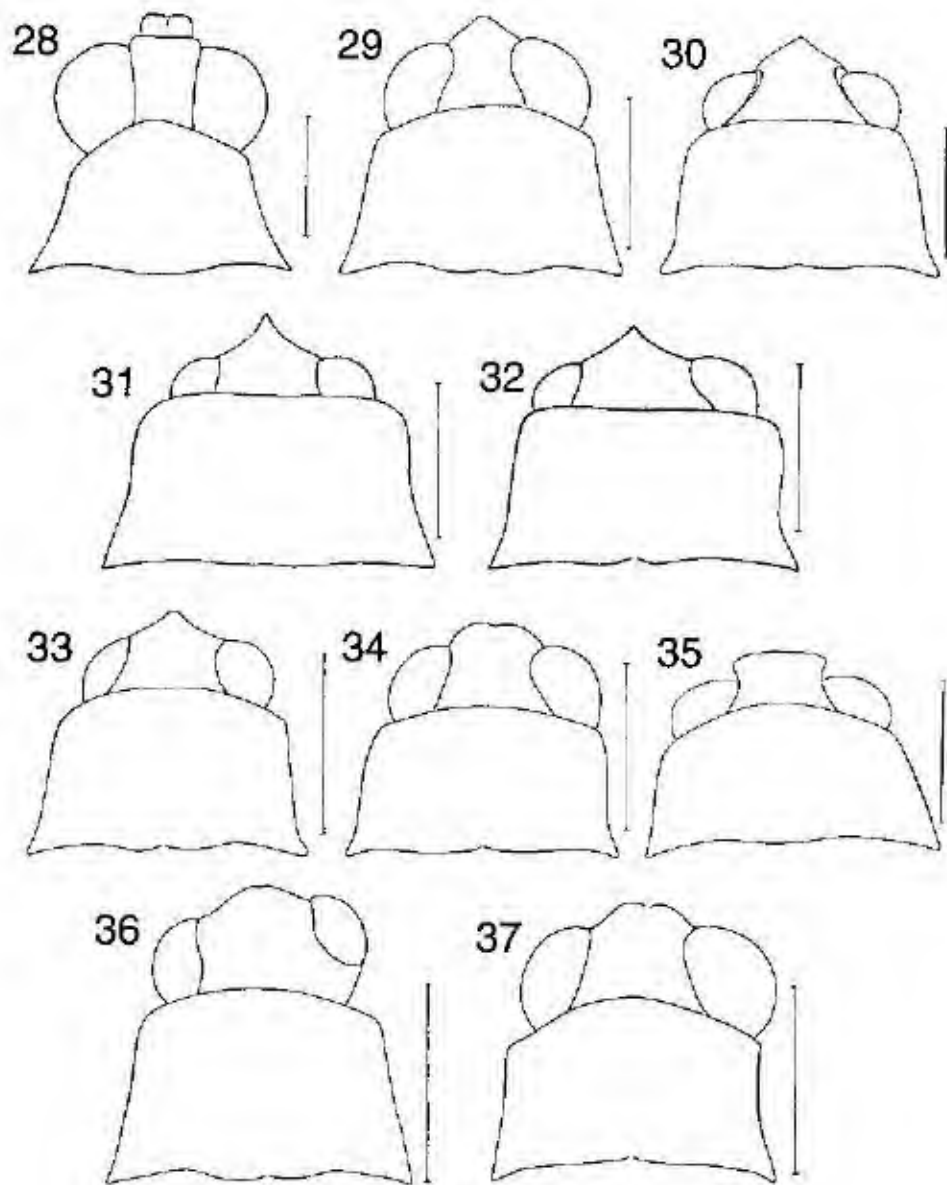
TYPE MATERIAL. Holotype, male, "Thailand, Chumphon prov., Pha Taeng, 9°48'N, 98°47'E, 27.10–14.11.1996, leg. K. Majer" (LMBC). Paratype, male, same data, 1–20.11.1996 (LMBC).

ETYMOLOGY. Named in honour of the collector of the holotype of the new species, Karel Majer (Brno).

DIAGNOSIS. Similar to *L. machongsongensis* sp. n. from which it differs in different shape of basal antennomeres (Fig. 26), in the length of parameres and other details of male genitalia.

DESCRIPTION. Whole body dark brown to black. Head with large eyes, eye diameter 1.5 times longer than interocular distance. Antennae more or less filiform, reaching over elytral midlength. Antennomere 3 short, 1.5 times shorter than 4, which is slightly shorter than 5. Antennomere 4 provided with stout lateral projection (Fig. 26). Mandibles arcuate, labrum transverse, almost oblong, apically emarginate. Maxillary palpi long, with terminal palpomere elongate, provided with 4 distal papillae, labial palpi also provided with apical papillae. Pronotum, transverse, widest at basal margin, anterior margin produced forwards, sides semicircularly emarginate, elevated. Posterior angles acute, widely projected obliquely backwards. Scutellum with shallow arcuate apical notch. Elytra elongate, weakly widened posteriorly, 3 times as long as humeral width and 1.2 times wider than pronotum. Each elytron with 4 weak costae, elytra divergent posteriorly, mesosternum transverse. Legs slender, tibiae straight, their spurs small, slender, trochanters long. Phallus slender, constricted before apex, parameres longer than half of phallus. Body length: 3.5–4.0 mm, humeral width: 0.9–1.0 mm. Female unknown.

REMARK. The holotype and paratype will be deposited in NMPC.



Figs 28-37. Head and pronotum: 28 - *Libinia chinensis* sp. n., 29 - *L. humanensis* Kleinz., 30 - *L. fodongshanensis* sp. n., 31 - *L. edentatus* sp. n., 32 - *L. yunnanensis* sp. n., 33 - *L. kubani* sp. n., 34 - *L. machongsongensis* sp. n., 35 - *L. chuangdaoensis* sp. n., 36 - *L. soppangensis* sp. n., 37 - *L. mayeri* sp. n. Scale - 0.5 mm.

***Libnetis kubani* sp. n.**
(Figs 9, 10, 33)

TYPE MATERIAL. Holotype, male, "Thai, Chiang Dao, 1000 m, 19° 25'N, 98° 52'E, 17–24 v. 1991, Vit Kuban leg." (LMBC)

ETYMOLOGY. Named in honour of the collector of the holotype of the new species, Vit Kuban (Brno).

DIAGNOSIS. Related to *L. machongsongensis* sp. n., from which it differs in having stouter phallus, smaller eyes, and in sharply pointed terminal segments of maxillary and labial palpi.

DESCRIPTION. Body dark brown, only trochanters and bases of femora as well as maxillary and labial palpi yellow. Head with slightly prominent eyes, eye diameter as long as interocular distance, antennae filiform, long, reaching distal quarter of elytra, antennomere 4 is 1.4 times longer than 3. Mandibles short, apically curved, labrum transverse, almost oval, maxillary palpi long, terminal palpomeres of both palpi apically pointed. Pronotum transverse, almost oblong, widest at base, anterior margin slightly produced forwards, sides elevated, weakly divergent backwards, posterior angles acute. Scutellum semicircularly emarginate apically. Elytra subparallel-sided, only weakly widened in posterior half, 3.1 times wider than humeral width, and slightly wider than pronotum. Each elytron with 4 costae, reticulate cells absent. Mesosternum transverse, trapezoidal. Legs very slender, compressed, tibiae straight, their spurs minute, trochanters long. Phallus straight, parameres slender, separate dorsally. Body length 3.7 mm, humeral width 0.95 mm. Female unknown.

REMARK. The holotype will be deposited in NMPC.

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Revision of *Babycurus* with descriptions of three new species (Scorpiones: Buthidae)

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Abstract The genus *Babycurus* Karsch, 1886 is revised, with diagnostic characters and geographic distributions given for all of its species. Neotype is designated for *B. buettneri*, the type species of the genus. Lectotypes are designated for *B. johnstoni* Pocock, 1896, *B. centrurimorphus* Karsch, 1886, *B. gigas* Kraepelin, 1896, *B. neglectus* Kraepelin, 1896, *B. uritatus* Werner, 1936, and *B. wutuensis* Kraepelin, 1913. *B. crassicaudatus* Roewer, 1952 is synonymized with *B. anvorgeti* Hirst, 1911, *B. johnstoni* Pocock, 1896 is synonymized with *B. buettneri* Karsch, 1886, *B. johnstoni ochraceus* Mast, 1912, *B. parisi* Borelli, 1925, and *B. crassimanus* Caporaccio, 1936 are synonymized with *B. tarantassoi* Borelli, 1919, which is hereby regarded as *Babycurus wutuensis tarantassoi* Borelli, 1919. *B. melanicus* sp. n., *B. multisubaculeatus* sp. n., and *B. ugartei* sp. n. are described and a key to the species of the genus *Babycurus* is provided. First records are established for *B. centrurimorphus* Karsch, 1886 in Mosambique and Rwanda, *B. kulu* (Pocock, 1890) in Guinea, *B. pictus* Pocock, 1896 in Angola, and *B. wutuensis tarantassoi* Borelli, 1919 in Ethiopia.

Taxonomy, description, revision, new species, new combination, checklist, key, Scorpiones, Buthidae, *Babycurus*, Africa, Arabia

INTRODUCTION

The genus *Babycurus* includes 16 species inhabiting Africa and Arabia (Tab. 2). Type specimens are in a number of institutions, most of which kindly provided them as well as unidentified material. This has allowed me to include all of FKCP, HHM, MBCZ, MZUF, NHMB, NMPC, SMFD, ZMHB, and ZMUH *Babycurus* specimens.

MATERIAL AND METHODS

The institutional abbreviations listed below and used throughout are mostly after Arnett et al. (1993), only FKCP and MBCZ are my own.

BMNH – British Museum (Natural History), London, England,
FKCP – František Kovařík Collection, Praha, Czech Republic,
HHM – Hungarian Natural History Museum, Budapest, Hungary,
MBCZ – Matt E. Braunwalder Collection, Zurich, Switzerland,
MCSN – Museo Civico di Storia Naturale “Giacomo Doria”, Genova, Italy,
MIZT – Museo Regionale di Scienze Naturali, Torino, Italy,
MRAC – Musée Royal de l’Afrique centrale, Tervuren, Belgium,
MZUF – Museo Zoologico de “La Specola”, Firenze, Italy,
NHMB – Naturhistorisches Museum, Basel, Switzerland,
NMPC – National Museum (Natural History), Praha, Czech Republic,
SMFD – Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany,
ZMHB – Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany,
ZMUH – Zoologisches Institut und Zoologisches Museum, Universität Hamburg, Germany.

Other abbreviations are as follows: M – male, F – female, juv – juvenile, A – specimens preserved in alcohol, E – specimens mounted dry, im – immature, TL – type locality, ht – holotype, al – allotype, pt – paratype, lt – lectotype, plt – paralecotype, nt – neotype.

Type localities are given exactly as in the original descriptions and abbreviations are supplemented by details from labels or by current political units/divisions.

Under material, the country is followed by all information given on the locality label.

Unfortunately, some labels are difficult to read, which may have caused a few inaccuracies in their transcription. Certain label data have proven altogether undecipherable.

All specimen numbers are given for the sake of completeness.

The term "proximal flexure" or "flexed" in reference to the male pedipalp fingers is hereby used instead of the more usual terms "recess and hump", "notch and lobe" or "scalloping".

The number of rows of granules on movable and fixed fingers of pedipalps has not been counted in a standard manner. Some authors exclude the short basal row and others also the terminal row. I have counted all rows of granules, including the basal and terminal rows. For example, for *Babycurus gigas* I give 10 rows of granules (Fig. 5), whereas Kraepelin (1913: 180) gives only eight.

This study was conducted in 1996–1999. Each examined specimen bears a label in Ariel or Times New Roman font produced on a laser printer. Basic data are also penciled on the reverse of the label, as permanency of laser print in alcohol cannot be trusted. The labels contain the generic and species name, author and year of the original description, whether the specimen is the holotype, lectotype or paralecotype, whether I have designated (dsg.), determined (det.), or only revised (rev.) the specimen, and my name plus the year of the examination.

***Babycurus* Karsch, 1886**

(Figs 1–40, Tables 1–3)

Babycurus Karsch, 1886: 77, Kraepelin, 1895: 80, Kraepelin, 1895: 88 (in part), Pocock, 1899: 835, Kraepelin, 1899: 61, Kraepelin, 1905: 337, Kraepelin, 1913: 179, Werner, 1934: 272, Vachon, 1940b: 179, Moriggi, 1941: 82, Lamoral & Reynders, 1975: 496, Sissom, 1990: 101, El-Hennawy, 1992: 97, 111, Kovarik, 1998: 104.

Buthus (*Rhoptrurus*) Pocock, 1899: 122 (in part).

Rhoptrurus Kraepelin, 1891: 238 (in part), Kraepelin, 1895: 80 (in part), Kraepelin, 1898: 3 (in part) (syn. by Kraepelin, 1895: 88, Kraepelin, 1899: 61).

TYPE SPECIES: *Babycurus buettneri* Karsch, 1886.

DIAGNOSTIC CHARACTERS. A combination of characters differentiates this genus from all other genera of the family Buthidae. The basic trichobothrial pattern is beta (Sissom 1990: 70, fig. 3.3), the fourth legs have well developed tibial spurs, the third legs lack tibial spurs, the pedipalp femur has two external trichobothria, pectines bear fulcra (Sissom 1990: 92, fig. 3.17d), setae on tibiae and tarsi are not arranged into bristlecombs, movable fingers of pedipalps have seven to 10 cutting edges (rows of granules) (Figs 2–13), the cheliceral fixed finger has two ventral denticles, and the dorsal surface of the mesosoma is granulated and bears one more or less conspicuous median keel. Pectinal teeth number 15–28. The first segment of the metasoma has 10 keels, the second through fourth segments have eight keels, and the fifth segment has five keels. Some keels, mainly ventral, may be lacking, especially in males. The telson has a distinct subaculear tooth.

***Babycurus ansorgei* Hirst, 1911**

(Figs 1–3, 14–15, 36, Tables 1–3)

Babycurus ansorgei Hirst, 1911: 467, Vachon, 1940b: 179, Belfield, 1956: 44, Lamoral & Reynders, 1975: 496, Kovarik, 1998: 104.

Babycurus crassicaudatus Roewer, 1952: 28 (in part) (TL: Congo Belge, Parc Nat. Upemba, Mahwe (rive Est lac Upemba), MRAC), Lamoral & Reynders, 1975: 497, Kovarik, 1998: 104, *syn. n.*

TYPE LOCALITY AND REPOSITORY. Dondo, N. Angola, BMNH.

TYPE MATERIAL EXAMINED **Angola** N. Angola, Dondo, 12 VI 1908, 1FA (holotype), purchased Dr. Anserge BMNH No. 1910.11.29.1. **CDR (Zaire)** Congo Belge, Parc Nat. Upemba, Kalungwe, affl. Senze et sous-affl. Lufira, alt. 800–1200 m, 20 VIII 1947, 3MA (paratypes Nos 1–3 of *B. crassicaudatus*), MRAC No. 114072, Kaswabilonga, riv. Lufira, 680 m, 7–9 X 1947, 1MA (paratype No. 4 of *B. crassicaudatus*), MRAC No. 114068, Mahwe, river E. of Upemba, 585 m, 6 XII 1948, 7MA (paratypes Nos 5–11 of *B. crassicaudatus*), MRAC No. 114066, Kanonga, affl. Fungwe, 675–695–860 m, 11–21 III 1949, 1MIFA (paratypes Nos 12–13 of *B. crassicaudatus*). All paratypes of *B. crassicaudatus* leg. G. F. de Witte.

ADDITIONAL MATERIAL EXAMINED **CDR (Zaire)** Bukama env., 16 IX 1980, 1MA1MB, leg. P. Dorsak, FKCP, 1FL, FKCP, Kiola Manono, Upper Shaba, 7°18' S, 27°25' E, 1000 m, 25 V 1988, 1MA, leg. E. K. Kisinba, MBCZ.

DIAGNOSTIC CHARACTERS Total length is 50–59 mm. In contrast to female, the male has a much wider manus of pedipalps (Figs 14–15, Tab. 1), fingers of pedipalps slightly flexed proximally, and the fifth metasomal segment much wider than the other segments (Fig. 36, Tab. 1). The carapace is nearly rectangular, slightly narrower anteriorly (see fig. 13 in Roewer 1952: 29). The movable fingers of pedipalps bear seven rows of granules (Figs 2–3), with the seventh row having one external and one (Fig. 3) or no (Fig. 2) internal granule. Only one male (MBCZ) has eight rows of granules, with the eighth row having one external and no internal granule. The fixed fingers of pedipalps bear six rows of granules, with the sixth having one external granule. For position and distribution of trichobothria on the tibia of pedipalps see Figs 14–15. Pectinal teeth number 17–20. The ventral surface of the seventh mesosomal segment is entirely smooth, without keels (male), or with up to four sometimes vague keels composed of widely spaced granules (female).

The metasomal keels are indistinct and rarely may be absent on the fifth segment. On the first two segments they are composed of very fine, widely spaced granules, on the remaining segments they are smooth. In males there are only smooth keels on the first two segments.

The entire animal is spotted with yellow to yellowish brown and blackish brown. The manus of pedipalps is yellow and the fingers are dark. The chelicerae are distally reticulated and proximally yellow without reticulation.

COMMENTS This species was based on a female collected by Dr. W. J. Anserge at Dondo. Hirst (1911: 467) distinguished it from *B. centrurimorphus* on different coloration.

B. crassicaudatus was based on 54 specimens from which Roewer selected the holotype. I examined 14 paratypes and numbered them 1–14. The fourteenth paratype, from Mabwe, was a female of *Hottentotta trilineata* (Peters, 1862). The chief character that Roewer used in describing of *B. crassicaudatus* was for *Babycurus* quite unusually widened fifth metasomal segment in the male (Fig. 36). However, *B. ansorgei* was based on a female, and it has therefore become necessary to compare females of the two species. The comparison causes me to conclude that *B. crassicaudatus* is a synonym of *B. ansorgei*.

DISTRIBUTION Angola (Hirst 1911: 467), CDR (Zaire) (Roewer 1952: 31).

Babycurus buettneri Karsch, 1886

(Figs 4, 16, Tables 1–3)

Babycurus buettneri Karsch, 1886: 78, Kraepelin, 1895: 89, Pocock, 1896: 430, Pocock, 1899: 835, Simon, 1903: 123, Borelli, 1911: 13, Kraepelin, 1913: 180, Strand, 1916: 140, Werner, 1916: 86, Lampe, 1918: 195, Werner, 1934: 272, Werner, 1936: 181, Vachon, 1940a: 254, Vachon, 1940b: 177, Roewer, 1943: 216, Bellfield, 1956: 44, Probst, 1972: 74.

Babycurus buettneri: Lamoral & Reynders, 1975: 496 (in part), Vachon, 1979: 222, Lourenço, 1986: 200, Warburg & Polis, 1990: 229, Kovařík, 1998: 104.

Buhus (*Rhopirinus*) *buettneri* Pocock, 1896: 122, Kraepelin, 1901: 268.

Rhopirinus buettneri Pocock, 1896: 138, Lonnberg, 1897: 183, Kraepelin, 1898: 3.

Babycurus buettneri Werner, 1902: 599, Montz & Fischer, 1980: 311.

Table 1. Measurements (in millimeters) of *Babaxarus* Karsch species. Line denoted "pectinal teeth" contains numbers of teeth on both sides separated by a colon. Explanatory notes: PT = numbers of teeth on both sides separated by a colon, T = total, I = first metasomal segment, tel = telson, ma = manus, fin = movable finger, L = length, W = width, patella width does not include thorns on internal surface

	total carapace metasoma										pedipalp										PT							
	T			I			II			III			IV			V			tel femur			patella			ubia ma fin			
	L	I	W	L	I	W	L	I	W	L	I	W	L	I	W	L	I	W	L	I	W	L	I	W	L	I	W	L
<i>B. ansorgei</i>																												
M, PT No 1 <i>B. crassicaudatus</i>	59.0	5.6	5.3	35.4	4.3	3.0	5.3	3.0	5.9	3.0	6.4	3.1	6.9	5.0	5.3	4.9	1.4	5.7	2.1	9.8	3.2	5.6	17.18					
F, HT, BMNH	56.0	5.9	5.9	29.5	3.6	3.2	4.2	3.1	4.5	3.1	5.2	3.4	6.5	3.5	5.0	1.7	6.2	2.3	9.8	2.4	6.1	18.18						
F, PT No 13 <i>B. crassicaudatus</i>	50.6	4.8	5.0	27.4	3.0	2.7	4.0	2.5	4.2	2.5	4.8	2.5	5.8	2.6	4.9	1.4	5.1	1.8	8.3	1.9	5.3	18.19						
<i>B. buettneri</i>																												
M, NT, ZMUH	63.0	6.3	6.3	36.6	4.1	3.7	5.2	3.7	5.8	3.7	6.4	3.7	7.9	3.7	6.5	6.0	1.7	6.6	2.4	11.7	3.5	7.0	18.19					
F, LT <i>B. johnstoni</i> , BMNH	65.0	6.9	7.0	35.0	4.0	3.9	5.1	3.6	5.6	3.6	6.2	3.4	7.5	3.3	6.2	6.3	1.7	7.1	2.6	12.0	2.3	7.9	19.20					
F, ZMHB (No 8168)	64.4	6.8	6.9	33.5	3.7	3.7	4.9	3.4	5.4	3.4	5.7	3.3	7.2	3.1	6.4	6.2	1.8	7.1	2.6	11.8	2.2	7.9	19.19					
<i>B. censis, umorphus</i>																												
M, ZMHB (No 7440)	58.3	6.0	6.0	34.1	4.1	3.3	4.9	3.2	5.1	3.3	5.6	3.4	7.6	3.1	6.0	7.4	1.6	8.2	2.1	13.1	2.8	7.7	19.20					
F, LT, ZMHB	64.2	6.8	7.1	36.1	3.9	3.7	5.1	3.7	5.3	3.5	6.1	3.5	8.1	3.4	7.0	6.3	1.8	7.5	2.5	12.3	2.8	7.3	19.19					
<i>B. eximius</i>																												
M, HT, NHMB	33.5	3.7	3.6	20.2	2.5	2.0	3.0	1.8	3.1	1.7	3.7	1.7	4.2	1.7	3.7	3.7	1.0	4.3	1.3	6.3	1.6	3.9	22.21					
F, PT No 1, NHMB	39.0	4.4	4.2	21.5	2.7	2.2	3.2	2.0	3.4	1.8	3.9	1.8	4.6	1.7	3.7	4.2	1.2	4.9	1.5	7.4	1.3	5.3	22.22					
<i>B. gigas</i>																												
M, ZMHB (No 8176)	110.0	10.2	10.1	63.0	7.3	5.5	8.8	5.2	9.9	5.3	10.7	5.3	12.9	5.5	11.0	9.9	2.9	11.5	4.2	18.8	5.3	11.7	22.22					
M, FKCP	93.0	10.1	9.7	57.9	7.2	5.1	8.6	5.1	9.3	5.1	9.8	5.1	12.0	5.1	10.2	9.3	2.7	10.5	4.2	18.1	5.5	11.0	21.22					
F, LT, ZMHB	89.5	9.9	10.8	52.8	6.8	5.2	7.8	4.8	7.9	4.5	8.3	4.5	11.1	4.2	10.2	9.0	2.9	10.3	4.0	17.2	3.5	11.3	22.22					
<i>B. jacksoni</i>																												
M, FKCP	68.9	7.5	8.3	41.5	4.8	4.7	6.0	5.1	6.5	5.2	7.2	5.2	8.5	4.6	7.2	7.1	2.4	8.2	3.2	14.1	4.5	8.2	19.19					
F, HT, BMNH	74.0	7.9	8.5	39.0	4.7	5.0	5.5	5.2	6.1	5.2	7.0	5.0	8.1	4.5	7.0	6.5	2.2	7.8	2.8	13.1	2.8	8.4	20.21					
F, FKCP	87.1	9.0	9.1	46.6	5.7	5.2	6.8	5.2	7.3	5.2	8.4	4.9	9.9	4.6	8.3	8.0	2.3	9.2	3.4	14.6	3.1	9.4	22.23					
<i>B. kerti</i>																												
M, HT, BMNH	65.0	7.1	7.0	38.0	4.7	4.1	5.6	4.2	6.0	4.2	7.0	4.4	8.0	4.6	6.7	6.6	2.0	7.5	2.7	13.5	4.0	8.2	19.20					
M, FKCP	65.6	6.5	6.0	35.6	4.1	3.6	5.2	3.6	5.8	3.7	6.3	4.0	7.5	4.0	6.2	6.1	1.5	7.0	2.4	12.3	3.8	7.3	19.19					
F, LT <i>B. neglectus</i> , ZMUH	60.6	6.5	6.3	33.6	3.5	3.9	4.7	3.7	5.0	3.8	5.9	3.9	7.5	3.9	5.9	5.6	1.8	6.6	2.5	10.9	2.2	7.1	18.18					

Babycarus johnstoni Pocock, 1896: 429, Kraepelin, 1899: 63, Lamoral & Reynders, 1975: 498, El-Hennawy 1992: 97, 111, Kovarik, 1992: 104, syn. n.

Babycarus johnstoni Kraepelin, 1913: 181, Borelli, 1925: 323, Vachon, 1940b: 177, Belfield, 1956: 44, Sinnat 1960: 536.

Babycarus (Rhopitrus) johnstoni Kraepelin, 1901: 268.

Babycarus neglectus Kovarik, 1992: 182.

Tityus bahiensis Kovarik, 1992: 184 (in part).

TYPE LOCALITY AND REPOSITORY: Gabon (West-Africa), ZMUH

TYPE MATERIAL EXAMINED: Cameroon: Rio del Rey, IFA (lectotype of *Babycarus johnstoni*), leg. H. H. Johnston, BMNH No. 1890.3.18.1-2. Gabon: West-Africa, 1884, IMA (neotype), det. Kraepelin 1900 as *Babycarus butnerti* ZMUH.

ADDITIONAL MATERIAL EXAMINED: Cameroon: Bipindi, IFA, leg. V. Zenker, No. 1851/07, ZMRB, IMA, leg. Karsch, ZMHB No. 7310. Kribi, ZMA, ZMHB No. 7439. Faktorei, Samakito, Ogoewe Africa, ZFA, leg. Max Schmidt, ZMHB No. 7575. 27.V.1893, (F) juv. A, leg. A. Dannenberg, ZMUH. Joh. Albrechtshöhe, VIII.1897, II-2 juvs. A, leg. Conradt, ZMHB No. 8167. Joh. Albrechtshöhe, 1897/1898, 3MA, leg. Conradt, ZMHB No. 8169. Joh. Albrechtshöhe, 10.V-1.VIII.1898, 1 juv. A, leg. Conradt, ZMHB No. 8170. Joh. Albrechtshöhe, 3-19.VIII.1898, 3F juv. A, leg. Conradt, ZMHB No. 8166. Mundame a Mungo, ZFA, leg. Koyan, ZMHB No. 8168. Victoria, IX.1898, IMA, leg. Preuss, ZMHB No. 8171. Pipindi, 28.VIII.1900, IFA, leg. Zenker, ZMHB No. 8172. Pipindi, ZMIFA, leg. Zenker, ZMHB Nos. 8174 and 10169. Jande, IFA, leg. Zenker, ZMHB No. 8173. Zapona, IMA, leg. Schuler, ZMHB No. 10165. Duala Jossplatte, VI.1903, IFA, leg. Ziemann, ZMHB No. 10167. Mukonja Farm Mungo, I.1.VII.1906, 3MST4 juvs. A, ZMUH, Kribi, S. Kamerun, X.1907, IMA, leg. Thiesing, ZMHB No. 10166. Edga, 4.XII.1907, IFA, ZMHB No. 10168. Kribi, I.1.VII.1914, 3FA, leg. F. Zenker, ZMUH, Douala, 1929, IFF, leg. David, NMPC. Mukonja, 1931, leg. R. Heinrich, ZFA, det. Werner 1936 as *Babycarus butnerti* ZMUH, Victoria Duala Edga, ZFA, leg. Guillemin, ZMHB No. 10170. Douala, 2FIME, leg. David, det. 1992, FKCP, Onest IME, III.1994, FKCP. Congo Mungo, 7.1.1893, IFA, leg. L. Haendel, ZMUH. Gabon: 1884, IFA, mus. Paris, det. Kraepelin 1900 as *Babycarus butnerti*, ZMUH. 4 juvs. A, leg. S. S. S. S. S., det. Wörmann 1900 as *Babycarus butnerti*, No. 4179. 6516, ZMUH, IFF, NMPC. ?, Ogoewe, 20.II.1892, IFA, leg. A. Schaudt, ZMUH. 15.VII.1915, 2MA, ZMUH, Ogoewe, IFA, SMFD No. 6695/102, det. 1932 as *Babycarus butnerti*.

DIAGNOSTIC CHARACTERS: Total length is 55-68 mm. In contrast to female, the male has a wider manus of pedipalps (Tab. 1). The movable fingers of pedipalps have nine rows of granules (Fig. 4), with the eighth and ninth rows merged into one uninterrupted row bearing two external granules (one female, ZMHB No. 10169, has on one pedipalp only one external granule) and one internal granule (Fig. 4). The fixed fingers of pedipalps have seven rows of granules, with the seventh row bearing two or one (lectotype of *B. johnstoni*) external granules and one or no internal granule. For position and distribution of trichobothria on the tibia of pedipalps see Fig. 16. Pectinal teeth number 17-21. The ventral surface of the seventh mesosomal segment bears four keels. Metasomal keels of both sexes are well defined and composed of distinct granules. For habitus see plate 3, fig. 1 of Karsch (1886).

The base color is reddish brown to dark brown. Fingers and patella of pedipalps, and usually the last two or three metasomal segments, are dark brown to black. The femur and manus of pedipalps are brownish red, and the legs are usually brownish red but may also be lighter and reach tones of yellow.

COMMENTS: The status of this species has been in doubt because the whereabouts of its holotype are unknown. It ought to be deposited at ZMHB, however in 1982 Vachon borrowed it and in turn apparently lent it to someone else. My attempts to locate the holotype have been unsuccessful.

B. kirki has been synonymized by Kraepelin (1899: 62), and *B. centrurimorphus* by Kraepelin (1891: 243) and Lamoral & Reynders (1975: 497), with this species. In German museums (SMFD, ZMHB and ZMUH) nearly all specimens labeled as *B. butnerti* agree with the lectotype of *B. johnstoni*, and several other specimens belong to *B. kirki*. Most specimens of *B. kirki* in German museums were identified as *B. neglectus*.

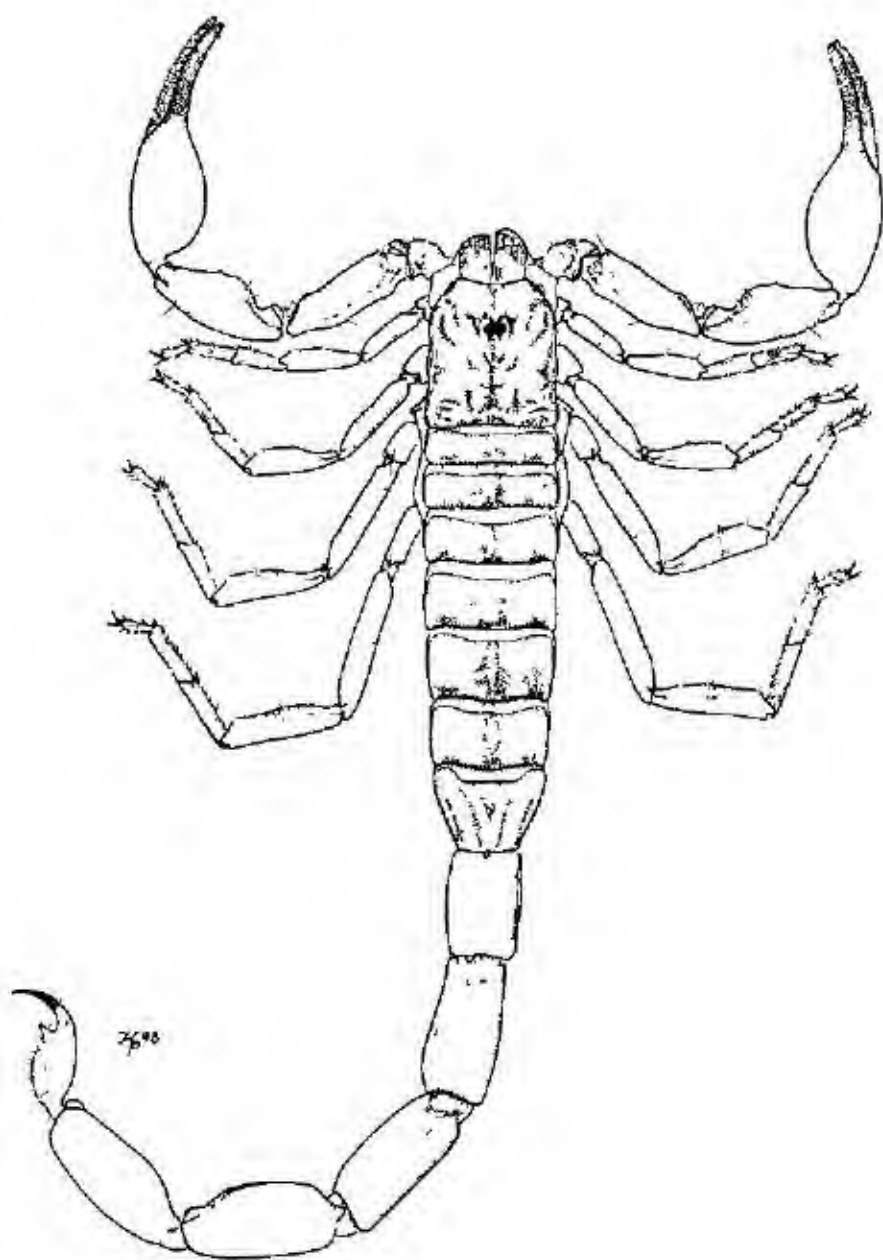


Fig 1 *Babycornus ansargoi* Hurst, FKCP male, dorsal aspect

Since *B. centrurimorphus*, *B. johnstonii*, and *B. kirki* (= *B. neglectus*) are different species whose types I have examined, and since I have not found in all the museum materials any specimen labeled as *B. buettneri*, which could not be placed in one of the above three species anyway, I am convinced that one of these species really is a synonym of *B. buettneri*. Existence of the type of *B. buettneri* thus becomes very important, especially since this is also the type species of the genus *Babycurus*. To resolve the mutual position and validity of the above species and to stabilize the generic name *Babycurus*, it is necessary to designate a neotype of *B. buettneri*. Since the holotype of *B. buettneri* was in ZMHB, it can be assumed that Kraepelin had examined it. Therefore, I decided to designate as the neotype of *B. buettneri* an adult male which Kraepelin identified as *B. buettneri* and which is from the same locality as the holotype. Specimens that agree with the lectotype of *B. johnstonii* were commonly identified as *B. buettneri* by other German arachnologists, such as Werner and Roewer (unfortunately, there are no specimens identified by Karsch, who described *B. buettneri*), which is evidenced by examined specimens, as well as by published keys. Since I decided to designate a neotype only after seeing all the specimens identified as *B. buettneri*, my identification labels bear the name *B. johnstonii*.

Babycurus johnstonii is based on two females collected by H. H. Johnston at Rio del Rey (Cameroon), one of which I have examined and designated as the lectotype.

DISTRIBUTION. Cameroon (Pocock 1896: 430), Congo (Kraepelin 1901: 268; Strinan 1960: 536), Gabon (Karsch 1886: 78), Guinea (Simon 1903: 123).

Babycurus centrurimorphus Karsch, 1886

(Figs 17, 33–34, Tables 1–3)

Babycurus centrurimorphus Karsch, 1886: 78; Kraepelin, 1895: 89, Kraepelin, 1896: 124 in part; Kraepelin, 1899: 63 in part; Kraepelin, 1913: 182, Birula, 1915: 16, Birula, 1915: 119 in part; Birula, 1916: 51 in part; Fage, 1929: 72; Werner, 1936: 181; Vachon, 1940b: 177; Roewer, 1952: 28; Geeraerts, 1953: 1066; Probst, 1973: 325; Vachon, 1979: 222; Mörz & Fischer, 1980: 312; Warburg & Polis, 1990: 234; Kovarik, 1998: 104.

Buthus (Rhoptrurus) centrurimorphus Pocock, 1890: 122.

Babycurus (Rhoptrurus) centrurimorphus. Kraepelin, 1901: 268.

? *Rhoptrurus buettneri* Kraepelin, 1891: 243.

Babycurus buettneri (in part) Lamoral & Reynders, 1975: 496–7.

TYPE LOCALITY AND REPOSITORY. N W Madagascar; ZMHB.

TYPE MATERIAL EXAMINED. N. W. Madagascar, SFA (lectotype and paracotypes Nos 1–4), leg. J. M. Hildebrandt, ZMHB No. 4307, rev. M. Vachon, 1979 No. 2446.

ADDITIONAL MATERIAL EXAMINED. Kenya. Brit O Afr., Eldamo River, SW Baringo Sea, XI 1907, 7Fljuv A, leg. Grote, ZMHB No. 10183. Mozambique: Tete, IV 1980, 1juv A 1juv E, FKCP. Rwanda: near Rusumo waterfalls in Akagera National Park, 1000 m, V.1994, 2FA, leg. H. Hinckel, MBCZ No. 750. Tanzania. Kawendo, 1FA, leg. P. Reinhardt, ZMHB No. 7577, Tanganyika See, IMA, leg. Böhm, ZMHB No. 7650; San Paolo de Loanda, 1FA, leg. Gleim, ZMHB No. 8180. D. O. Afrika, Neuwed-Ukerewe, 1FA, leg. P. Conradt, ZMHB No. 10184; Loanda, 1FA, leg. Karl May, ZMHB No. 10186; Ponta das Palmerinkas sudl. Loande Suruecu, 10.VII.1900, 1FA, leg. Consul Gleim, ZMHB No. 10182; D. O. Afrika, Usambara, IX–X 1911, IMA, leg. Hony & Meyer, ZMHB No. 10185, Tanganyika Terr., Uvinga, 1934, 1M4FA, leg. Prescott-Lehrmann, NHMB; Lake Tanganyika, V. 1980, IMIFE, FKCP. ? 1FA, leg. Fischer, ZMHB No. 7508.

DIAGNOSTIC CHARACTERS. Total length is 55–65 mm. In contrast to female, the male has longer and narrower femur, patella, and manus of pedipalps (Tab. 1, Figs 33 and 34), and its fingers are not flexed. The movable fingers of pedipalps bear seven rows of granules (Fig. 3). The fixed fingers bear six rows of granules and the sixth row has one external granule. For position and distribution of trichobothria on the tibia of pedipalps see Fig. 17. Pectinal teeth number 17–21. The ventral surface of the seventh mesosomal segment may be smooth, without keels (lectotype), or bear two incon-

Table 2 Geographic distribution of *Babycus* Karsch species Abbreviations: AN – Angola, CA – Cameroon, CD – CDR (Zaire), CO – Congo, ER – Eritrea, ET – Ethiopia, GA – Gabon, GU – Guinea, IC – Ivory Coast, KE – Kenya, MO – Mosambique, NI – Nigeria, OM – Oman, RW – Rwanda, SE – Senegal, SO – Somalia, TA – Tanzania, TO – Togo, UG – Uganda, YE – Yemen

	AN	CA	CD	CO	ER	ET	GA	GU	IC	KE	MO	NI	OM	RW	SE	SO	TA	TO	UG	YE
<i>B. ansorgei</i>	x	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. buellneri</i>	-	x	-	x	-	-	x	x	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. centurimorphus</i>	-	-	x	-	-	-	-	-	-	x	x	-	-	x	-	-	x	-	-	-
<i>B. exiguus</i>	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-
<i>B. gigas</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. jacksoni</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. larkii</i>	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. melanus</i> sp. n.	-	-	-	-	-	-	x	x	x	-	-	x	-	-	x	-	-	x	-	-
<i>B. multisubcinctus</i> sp. n.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	x	-	-	-	-
<i>B. ornatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. pictus</i>	x	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	x	-	-	-
<i>B. romanicus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. subpunctatus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. ugarii</i> sp. n.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. witiensis witiensis</i>	-	-	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-
<i>B. witiensis laramassoi</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>B. zambonellii</i>	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	-	-	-	x

spicuous keels (paralectotypes). Metasomal keels consist of minute granules of equal size. In females the fifth metasomal segment has in addition to four lateral keels also a ventral keel marked by widely spaced granules. In males the first two metasomal segments bear both dorsal and lateral keels, the remaining segments only dorsal keels, and ventrally the entire metasoma is smooth, rounded, entirely without keels. For male habitus see plate 3, fig. 2 of Karsch (1886).

The color is yellow to yellowish green, with three black bands on the mesosoma. The metasoma is light yellow with dark spots on the ventral surface. Pedipalps are yellow with dark fingers. Immature specimens may be yellow with brown spots.

COMMENTS. *B. centrurimorphus* is based on an unspecified number of specimens collected by J. M. Hildebrandt in northwest Madagascar. I have examined five females marked as types and have designated them as the lectotype and paralectotypes Nos 1–4. The original color of the types has been lost due to the long preservation in alcohol, and it is now entirely yellowish brown. The correctness of the type locality (Madagascar – Karsch 1886: 79) was repeatedly doubted (Kraepelin 1913: 182), and Lourenço (1996) does not include *B. centrurimorphus* among Madagascar scorpions.

DISTRIBUTION. Some of the published localities appear to be incorrect, and presumably the species occurs only in CDR (Zaire) (Roewer 1952: 28), Kenya (Kraepelin 1901: 268), Mosambique (first report), Rwanda (first report), and Tanzania (Kraepelin 1899: 63).

The record from Angola (Kraepelin 1913: 182) ought to be regarded as erroneous. Probst (1973: 325) thought that it could be an introduction, but another possibility is a misidentified *B. ansorgei*.

Babycurus exquisitus Lowe, 2000

(Fig 38, Tables 1–3)

Babycurus exquisitus Lowe, 2000: 185

TYPE LOCALITY AND REPOSITORY. Oman, Jabal Shams, Jabal Akhdar, Al Hajar Al Gharbi, 23°14'29" N, 57°11'62" E, NHMB

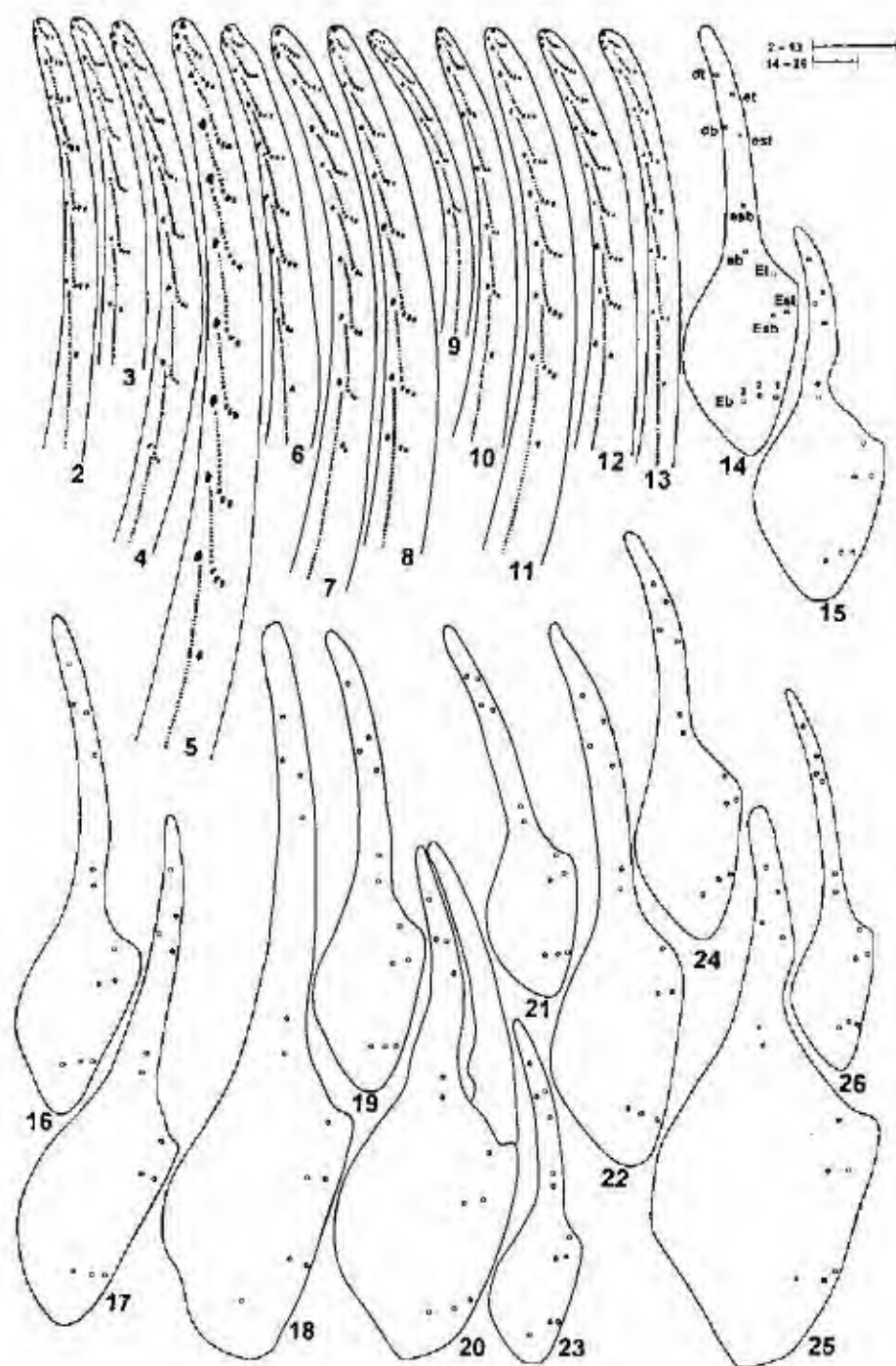
TYPE MATERIAL EXAMINED. Oman: Jabal Shams, 23°14'29" N, 57°11'62" E, 1855, 2 X 1994, 1M1F1 juv A (holotype, paratypes Nos 1–2), leg. G. Lowe & M. D. Gallagher, NHMB

DIAGNOSTIC CHARACTERS. Total length is 33.5–39 mm. In contrast to female, the male has a broader manus of pedipalps (Tab. 1) and larger pectinal teeth. The movable fingers of pedipalps bear eight rows of granules (Fig. 13), and the eight row has one external and no internal granule (Fig. 13). The fixed fingers bear eight rows of granules, and the eight row lacks external and internal granules. For position and distribution of trichobothria on the pedipalps see figs in Lowe (2000). Pectinal teeth number 21–22.

The manus of pedipalps is smooth, without keels. The patella of pedipalps bears six well developed keels.

→

Figs 2–26. Figs 2–13. Movable finger of pedipalp. Figs 14–26. Tibia of pedipalp, ventral view. Figs 2–3, 14–15. *B. ansorgei* Hirst. Figs 2, 14. *B. ansorgei* Hirst, female holotype. Figs 3, 15. *B. crassicaudatus* Roewer, male paralectotype No. 4. Figs 4, 16. *B. buettneri* Karsch, FKCP female. Fig. 17. *B. centrurimorphus* Karsch, female lectotype. Figs 5, 18. *B. gigas* Kraepelin, female lectotype. Fig. 6. *B. jacksoni* (Pocock), female holotype. Figs 7–8, 19–20. *B. kirki* (Pocock). Figs 7, 19. *B. neglectus* Kraepelin, female lectotype. Figs 8, 20. *B. kirki* (Pocock), FKCP male. Fig. 9. *B. ornatus* Werner, female lectotype. Figs 10, 21. *B. somalicus* Hirst, female lectotype. Fig. 22. *B. subpunctatus* Borelli, female holotype. Fig. 23. *B. wituensis wituensis* Kraepelin, female lectotype. Figs 11–12, 24–25. *B. wituensis tarantassoi* Borelli. Fig. 11. *B. wituensis tarantassoi* Borelli, MCSN female. Figs 12, 24. *B. pairisi* Borelli, female holotype. Fig. 25. *B. crassimanus* Caporacco, male holotype. Figs 13, 26. *B. zambonellii* Borelli, MZUF female.



The seventh mesosomal segment is ventrally smooth, with four incomplete keels. In the male the fourth and fifth metasomal segments are smooth, with very poorly developed and hard to discern keels. All other metasomal keels are composed of rounded, equally sized and spaced granules. The telson lacks keels and is densely covered by long hairs (Fig. 38).

DISTRIBUTION. Oman (Lowe 1999: 185).

Babycurus gigas Kraepelin, 1896

(Figs 5, 18, Tables 1–3)

Babycurus gigas Kraepelin, 1896: 124; Kraepelin, 1899: 63; Kraepelin, 1913: 181; Birula, 1915: 30; Birula, 1916: 51; Strand, 1916: 70; Loveridge, 1925: 307; Fage & Simon, 1936: 303; Vachon, 1940b: 179; Probst, 1973: 324; Lamoral & Reynders, 1975: 497; Moritz & Fischer, 1980: 314; Kovarik, 1997: 179; Kovarik, 1998: 104.

TYPE LOCALITY AND REPOSITORY. Deutsch-Ostafrika, Usambara (new designation); ZMHB.

TYPE MATERIAL EXAMINED. **Tanzania:** Usambara, Daruma, 8.X.–4.XI.1891, 1F1juv A (lectotype and paralectotype No. 1), leg. Conradt, ZMHB No. 7369, D.O.Afrika, Tanga, X.1895, 1FA (paralectotype No. 2), IMA (paralectotype No. 3), leg. Reimer, Mus. Berlin, ZMUH.

ADDITIONAL MATERIAL EXAMINED. **Tanzania:** D.O.Afrika, 1juv E, NMPC, Usambara mts, Tanga, leg. Reimer, 9F1juv A, ZMHB No. 7624, IMA, ZMHB No. 8178; Usambara, Daruma, 29.VIII.–8.IX.1891, 1FA, leg. Conradt, ZMHB No. 8177; Bulog b. Tanga, 20.VII.1895, 1M1F(im)A, leg. P. Lucker, ZMHB No. 8187; D.O.Afrika, 1.VII.1899, 1juv A, leg. Stuhlmann, ZMUH; D.O.Afrika, 3.X.1899, 1M1F2juvs A, leg. Kütner, ZMHB No. 8176, Usambara, Nguelo, 4FA, leg. Kummer, ZMHB No. 7859, 1FA, ZMHB No. 10175, Usambara, Nguelo, 2.I.1902, 1FA, leg. Sunder, ZMHB No. 10177, Usambara, Rolle, Nguelo, 23.X.1903, 1M2FA, ZMUH, Nanobo, 1FA, leg. Kummer, ZMHB No. 7860, D.O.Afrika, Nguru?, 1M2F1juv A, leg. Rohrbeck, ZMHB No. 10173, 2FA, ZMHB No. 10181, D.O.Afrika, 2FA, leg. Vosseler, ZMHB No. 10174; Tanga, 1juv A, leg. Vosseler, ZMHB No. 10179; D.O.Afrika, Amani, 21.X.1905, 1FA, leg. A. Borgert, ZMUH, Amani, 22.II.1906, 1F23juvs (after first ecdysis) A, leg. Vosseler, ZMHB No. 10180; Amani?, 25.–30.XII.1906, 1FA, leg. Vosseler, ZMHB No. 10172; Amani, XI.1907, 1F(im)A, leg. Vosseler, ZMHB No. 10176, D.O.Afrika, Amani, 17.XII.1908, 1FA, Tropeninst., ZMUH, Darasalam, 25.III.1911, 1juv A, leg. Eichelbaum, ZMUH; D.O.Afrika, Amani, 25.III.1911, 1M3FA, leg. Eichelbaum, ZMUH, Usambara Mts, 1989, leg. Mahunka & Ziesl, 1M1FA, FKCP, 1FA, HHM; Nias, 1F1ME, det. 1991, FKCP; E. Usambara Mts, dini di Amani, 17.–20.VI.1998, 1juv (20:20), leg. L. Bartolozzi & A. Sforzi, MZUF No. 2161, ? W. Afrika/Cap, Exp. Falkenstein, 1FA, ZMHB No. 7259/8179.

DIAGNOSTIC CHARACTERS. Total length is 89–110 mm, the largest in the genus. In contrast to female, the male has a broader manus of pedipalps (Tab. 1). Furthermore, the female has well developed keels on the fifth metasomal segment, whereas in the male these keels are poorly developed or lacking. The movable finger of pedipalps bears 10 rows of granules (Fig. 5) and the fixed finger of pedipalps bears nine rows of granules. The 10th row has one or rarely two (in one ZMHB male only) external granules and no or rarely one internal granule. For position and distribution of trichobothria on the tibia of pedipalps see Fig. 18. Pectinal teeth number 19–24.

The ventral surface of the seventh mesosomal segment bears four keels. Metasomal keels are always present and consist of minute, equally sized and widely spaced granules.

The color is uniformly yellowish brown to yellowish red, with the end of the metasoma and fingers of pedipalps dark brown to black. In juveniles and young adults much of the patella of pedipalps is dark brown to black, and juveniles further have three dark longitudinal bands on the dorsal surface of the mesosoma.

COMMENTS. This species is based on an unspecified number of individuals deposited at ZMHB and ZMUH, which according to Kraepelin (1896: 125) are from Tanga and Usambara. I designated as lectotype a ZMHB female from Deutsch-Ostafrika, Usambara. Under "Additional material examined" are included other ZMHB specimens from Usambara and Tanga, some of them collected by Dr. Conradt who also collected the types. However, they do not carry labels which would ascertain that Kraepelin considered them types, and therefore cannot be included in the type series.

DISTRIBUTION Tanzania (Kraepelin 1896: 125).

Babycurus jacksoni (Pocock, 1890)

(Fig. 6, Tables 1–3)

Rhoptrurus jacksoni Pocock, 1890: 138

Babycurus jacksoni Kraepelin, 1896: 124

Babycurus jacksoni Kraepelin, 1895: 88, Pocock, 1896: 430, Kraepelin, 1899: 62, Tullgren, 1907: 4, Simon, 1909: 43, Kraepelin, 1913: 182, Birula, 1915: 18, Birula, 1916: 51, Strand, 1916: 70, Loveridge, 1925: 308, Vachon, 1940a: 248, Vachon, 1940b: 177, Ooeracerts, 1953: 1066, Bucherl, 1959: 258, Probst, 1973: 325, Lamoral & Reynders, 1975: 497, Kovarik, 1997: 179, Kovarik, 1998: 104

Babycurus (Rhoptrurus) jacksoni Kraepelin, 1901: 268

TYPE LOCALITY AND REPOSITORY Taveita, Kilima-njaro, BMNH.

TYPE MATERIAL EXAMINED Kenya Taveita, Kilima-njaro, E Africa, IFA (holotype), leg. F. J. Jackson, BMNH No. 87.147

ADDITIONAL MATERIAL EXAMINED Kenya O. A. Afrika, Mombasa, 25 XII 1969, IFA, leg. M. Grasshoff, SMFD, Watamu Beach, 11 1981, IMA, leg. Karagulasho, SMFD, Mombasa, V 1986, IFA, FKCP, Tsavo East National Park, Ngai, 3 VII 1992, IFA, leg. Mahunka & Mahunka-Papp, HNHM, Ukunda, Diani Beach, 5 VII 1992, IFA, leg. Mahunka & Mahunka-Papp, HNHM, Shimba Hills Nat. Park (S. of Mombasa), 8–24 VI 1998, IF (20.22), leg. A. Sforzi & L. Bartolozzi, MZUF No. 2161 Tanzania D. O. Afrika, IFE, NMPC, Darassalam, XII 1893, IMA, leg. Stuhlmann, ZMHB No. 7563, Darassalam, 3 VII 1895, IFA, leg. Stuhlmann, ZMHB No. 7572, Lindi, IMA, leg. Fülleborn, ZMHB No. 8175, D. O. Afrika, Nyebo, IFA, leg. Kummer, ZMHB No. 7861/8070, D. O. Afrika, Darassalam Pangani u. Hinterland, 2M1411 juvs A (juvs before first ecdysis), leg. R. Regner, ZMHB No. 10187 D. O. Afrika, Dar es Salaam, 17 XI 1896, 3FA, leg. Speyer, ZMUH, Amani, X 1904, IF(im)A, leg. Vosseler, ZMHB No. 10188, Molalo, 8 IX 1905, IF(im)A, leg. pastor K. Rohl, ZMHB No. 1169/1905, D. O. Afrika, Morogoro, 2FA, I–III 1909, leg. R. Schoenheit, ZMHB No. 10192, D. O. Afrika, Mkatta, I–VI 1909, IFA, leg. R. Schoenheit, ZMHB No. 10190, D. O. Afrika, Morogoro, IM, 22 VIII 1909, leg. R. Schoenheit, No. 10178, D. O. Afrika, Darassalam u. Hinterland bis Puguherge und Kisserawz, IMIFA, leg. P. Heinrich, ZMHB No. 10191, D. O. Afrika, Ostfluss des Gologolo Gebirges, IMA, 8–9 XI 1912, leg. Ratmethner, ZMHB No. 10189 D. O. Afrika, Dar es Salaam, 9 I 1913, 2FA, leg. W. Vogel, ZMUH, 2FE, 1920–1940, FKCP 45 km Tanga, 8 V 1933, IMIFA, leg. W. Dethlefsen, ZMUH No. 95, Manyanga, 24 III 1989, IMA, leg. S. Mahunka & A. Zicsi, HNHM, Morogoro prov., Ulagura Mts., 8–9 XII 1996, 1ME, leg. Werner & R. Lutzler, FKCP, E. Usambara Mts., dint. di Amani, IFE, 17–20 VI 1998, 1989, Ijuv A, FKCP ? Tanzania D. O. Afrika, Plantage Lewa, 28 II 1888, IF1 juv A, leg. Stuhlmann, ZMUH D. O. Afrika, Ligiplus, 15 XII 1904, Ijuv A, No. 898/05, ZMHB, Zanguenar, Unigura, III 1900, IFA, Mus. Paris, ZMUH, D. O. Afrika, Morogoro, V 1911, IM3FA, Mus. Berlin, ZMUH ? Namibia Windhoek (locality in error ?), V 1912 6M7FA, leg. J. Schmidt, SMFD Nos 5293 and 5314 ? O. Afrika, 2FA, leg. Knippes, SMFD, Haiti, Santiago de los Caballeros, XI 1936, IMA, leg. P. Thumb (locality in error = ? Tanzania), ZMUH, No. 121, 1FA, ZMUH No. 126

DIAGNOSTIC CHARACTERS Total length is 60–87 mm. In contrast to female, the male has a broader manus of pedipalps (Tab. 1) and the fingers of pedipalps slightly flexed proximally (Fig. 20). The movable fingers of pedipalps bear eight rows of granules terminating in two external granules (Fig. 6). The eighth row always has one external granule (Fig. 6). Only two females (ZMHB No. 10187 and MZUF No. 2161) were found to have also one internal granule situated opposite the external one. All other examined specimens lacked internal granules. The fixed fingers of pedipalps bear seven rows of granules, and the seventh row has one external and no internal granule.

The position of trichobothrium db on the tibia of pedipalps is variable in relation to trichobothrium er. The pectinal teeth number 18–24. In females the seventh mesosomal segment bears four ventral keels composed of large, sometimes widely spaced granules, in males these keels may lack granules. Metasomal keels are always present and consist of large, conspicuous granules. In the male there are large granules also between these keels, especially on the third through fifth segments.

Adults are rusty to rusty brown, with only the fingers of pedipalps black. The carapace sometimes bears a pronounced dark triangle anteriorly, and dark spots are always present around the eyes. The anterior parts of mesosomal segments may rarely be black. The chelicerae may or may not be reticulated, and at least anteriorly are solid black.

COMMENTS. This species is based on a single female collected by F. J. Jackson at Taveta, Kilimanjaro. DISTRIBUTION. Kenya (Pocock 1890: 139), Tanzania (Kraepelin 1899: 63), Uganda (Simon 1909: 43), and CDR (Zaire) (Geeraerts 1953: 1066).

***Babycurus kirki* (Pocock, 1890)**
(Figs 7–8, 19–20, 29–30, Tables 1–3)

Rhapturus kirki Pocock, 1890: 137, Pocock, 1896: 429.
Babycurus kirki Kraepelin, 1895: 88, Pocock, 1899: 835, Kraepelin, 1913: 180, Werner, 1936: 181, Vachon, 1940b: 176, Belfield, 1956: 44, Lourenço, 1986: 200, Kovarik, 1998: 104.
Rhapturus dentatus (err. non Karsch, 1886) Kraepelin, 1891: 241 (see Kraepelin, 1899: 63).
Babycurus neglectus Kraepelin, 1896: 126 (TL Klein-Pope, ZMUH), Kraepelin, 1899: 63, Werner, 1902: 599, Kraepelin, 1913: 180, Werner, 1916: 86, Lampe, 1918: 195, Werner, 1934: 272, Roewer, 1943: 216, Belfield, 1956: 44, Lamoral & Reyniers, 1975: 498 (syn. by Vachon, 1940b: 179).
Babycurus butnert (? in part) Kraepelin, 1899: 62.
Babycurus butnert (in part) Lamoral & Reyniers, 1975: 496.

TYPE LOCALITY AND REPOSITORY. West Africa, BMNH.

TYPE MATERIAL EXAMINED. **Togo** Klein-Pope, XI 1892–20 I 1893, IFA (lectotype of *B. neglectus*), leg. H. Brauns, ZMUH ? West Africa, IMA (holotype), Dr Kirk, BMNH No. 65.60 ? IMA (paralectotype No. 1 of *B. neglectus*), ZMUH No. 3917.

ADDITIONAL MATERIAL EXAMINED. **Cameroon** Anecho, 3 IV 1906, IFA, leg. Dr Otto, ZMUH. **Congo**, IX 1911, IFA (in IFA), Mus. Stockholm, ZMUH. **Gabon** Reserve Lope, XII 1995, IMA, FKCP. **Guinea** Kankan, Savanne, 25 VIII 1977, IFA, leg. T. Diokite, ZMHB. **Ivory Coast** IFA, NHMB ? **Nigeria** Vohla, Akure, 1890, IFA, ZMUH. **Senegal** Niokolo Koba n.p., VII 1995, IFA, FKCP. **Togo** Bismarckburg, 1–15 X 1891, IFA, leg. Butner, ZMHB No. 7630. Kraty: 4M6F3juvsA, leg. Zech, ZMHB No. 8183. Kete Kratschi, 1MIFA, leg. Zech, ZMHB No. 8184, Misahohe, IFA, leg. Smemo, ZMHB No. 10171, Klein-Pope, 1892, IFA, ZMUH, Kete Kratschi, 2FA [det. 1943 as *B. neglectus*], SMFD No. 8873/215, VI 1908, 1MIFA, Mus. Bremen, ZMUH. Atakpame, IFA (det. 1932 as *B. neglectus*), SMFD No. 6696/103, Lome, 31 V 1936, 1juvA, leg. F. Zielinski, ZMUH No. 96 ? IFA, ZMHB No. 729/1910 and 10193, West-Afrika, 29 V 1917, IMA, leg. Woermann, ZMUH, W. Afrika, Akro, 1882, IFA, leg. Bender, Mus. Stuttgart, ZMUH.

DIAGNOSTIC CHARACTERS. Total length is 60–65.6 mm. In contrast to female, the male has a broader manus of pedipalps (Figs 19–20, Tab. 1), a more ampullar telson (Figs 29–30), and fingers of pedipalps slightly flexed proximally (Figs 19–20). The movable fingers of pedipalps bear eight to 10 rows of granules always terminating in two external granules (Figs 7–8). In case of eight or nine rows of granules, the last row has two external and no internal granules (Fig. 7), or sporadically (mainly in males) also one internal granule (Fig. 8). In case of 10 rows of granules (only one examined female), the tenth row lacks external granules. The fixed fingers of pedipalps bear eight rows of granules (one FKCP male has only seven rows), and the eighth row has two external and one or no internal granules.

For position and distribution of trichobothria on the tibia of pedipalps see Figs 19–20. The position of trichobothrium db is variable in relation to trichobothrium el (Figs 19–20). Pectinal teeth number 18–21. The seventh mesosomal segment is ventrally either smooth, without keels, or rarely bears four keels (the holotype). Females have all metasomal segments keeled, but the keels are smooth, without discernible granules, and with the exception of the first segment poorly visible. Males differ in having the fourth and fifth metasomal segments always entirely smooth, without keels.

Table 3. Numbers of pectinal teeth in *Babycarus* Karsch species. Explanatory notes: M – male, F – female, J – juvenile (includes only juveniles whose sex cannot be determined), x – number of pectinal teeth given by other authors, not from specimens examined in this study, NS – number of specimens. Each pecten is considered a unit. Where both pectens are complete, they are counted twice. In contrast, pectens which are obviously abnormal or incomplete are not included.

	sex	15	16	17	18	19	number teeth in pecten												NS
							20	21	22	23	24	25	26	27	28				
<i>B. ansorgei</i>	M	—	—	3	11	13	3	—	—	—	—	—	—	—	—	15			
	F	—	—	—	5	1	—	—	—	—	—	—	—	—	—	3			
<i>B. buettneri</i>	M	—	—	—	4	18	10	2	—	—	—	—	—	—	—	19			
	F	—	—	2	19	28	8	3	—	—	—	—	—	—	—	31			
<i>B. centromorphus</i>	J	—	—	2	8	12	4	2	—	—	—	—	—	—	—	14			
	M	—	—	—	—	4	1	1	—	—	—	—	—	—	—	3			
<i>B. eximius</i>	F	—	—	—	7	34	8	1	—	—	—	—	—	—	—	26			
	J	—	—	1	4	1	—	—	—	—	—	—	—	—	—	3			
<i>B. gogus</i>	M	—	—	—	—	—	—	1	1	—	—	—	—	—	—	1			
	F	—	—	—	—	—	—	—	2	—	—	—	—	—	—	1			
<i>B. jacksoni</i>	J	—	—	—	—	—	—	2	—	—	—	—	—	—	—	1			
	M	—	—	—	—	—	—	4	10	3	1	—	—	—	—	9			
<i>B. kirki</i>	F	—	—	—	—	3	6	26	32	9	2	—	—	—	—	40			
	J	—	—	—	—	—	4	6	3	3	—	—	—	—	—	8			
<i>B. jacksoni</i>	M	—	—	—	—	3	4	11	9	1	1	—	—	—	—	15			
	F	—	—	—	—	10	32	26	21	3	2	—	—	—	—	47			
<i>B. kirki</i>	J	—	—	—	1	1	—	—	—	—	—	—	—	—	—	1			
	M	—	—	—	—	9	10	1	—	—	—	—	—	—	—	10			
<i>B. melanicus</i> sp. n.	F	—	—	—	11	19	12	2	—	—	—	—	—	—	—	22			
	J	—	—	—	2	2	—	—	—	—	—	—	—	—	—	3			
<i>B. multisubaculeatus</i> sp. n.	F	—	—	—	—	—	2	—	—	—	—	—	—	—	—	1			
<i>B. ornatus</i>	M	—	—	—	—	2	—	—	—	—	—	—	—	—	—	1			
	F	1	9	3	—	—	—	—	—	—	—	—	—	—	—	7			
<i>B. pictus</i>	J	—	2	1	1	—	—	—	—	—	—	—	—	—	—	2			
	M	—	—	—	—	2	2	—	—	—	—	—	—	—	—	2			
<i>B. somalicus</i>	F	—	—	—	1	8	1	—	—	—	—	—	—	—	—	5			
<i>B. subpunctatus</i>	F	—	—	—	—	1	3	—	—	—	—	—	—	—	—	2			
<i>B. ugarii</i> sp. n.	F	—	2	—	—	—	—	—	—	—	—	—	—	—	—	1			
<i>B. ugarii</i> sp. n.	F	1	1	—	—	—	—	—	—	—	—	—	—	—	—	1			
<i>B. wiluensis wiluensis</i>	M	—	—	—	—	—	—	2	1	—	—	—	—	—	—	2			
<i>B. wiluensis taramassori</i>	F	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1			
	M	—	—	—	—	—	—	—	—	—	4	1	3	1	1	5			
<i>B. zambonelli</i>	F	—	—	—	—	—	—	13	5	8	8	3	5	—	—	20			
	J	—	—	—	—	—	—	8	20	16	11	8	—	—	—	33			
<i>B. zambonelli</i>	M	—	—	—	1	1	—	—	—	—	—	—	—	—	—	1			
	J	—	—	—	—	2	—	—	—	—	—	—	—	—	—	1			

The color is yellow with black spots. The carapace has dark spots and a pronounced dark triangle anteriorly. The mesosoma dorsally bears a dark median band and numerous spots that form a symmetrical pattern. Chelicerae are reticulated. The femur and patella of pedipalps are dark with a few yellowish spots, the manus of tibia is yellow, and the fingers are dark brown. Legs are spotted. Metasomal segments of females are yellowish brown with small dark spots. In males the fourth and fifth metasomal segments are dorsally as well as ventrally reddish black. For male habitus see plate 14, fig. 1 of Pocock (1890).

COMMENTS. This species is based on a single male labeled "West Africa the collection of Dr (now Sir John) Kirk" (Pocock, 1890: 138).

I examined two syntypes of *B. neglectus* and designated them the lectotype and paralectotype No. 1. Kraepelin (1891: 241 and labels) originally identified this species as *Rhoptrurus dentatus*, and in 1896 described it as *B. neglectus*.

DISTRIBUTION. Cameroon (Werner 1916: 86), Gabon (Kraepelin 1894: 88), Guinea (first report), Ivory Coast (Loureño 1986: 200), Nigeria (Belfield 1956: 44), Senegal (first report), Togo (Pocock 1899: 835).

***Babycurus melanicus* sp. n.**

(Figs 27, 39, Tables 1–3)

TYPE LOCALITY AND REPOSITORY. CDR (Zaire), west; FKCP.

TYPE MATERIAL. CDR (Zaire) west, IX.1976, 1FA (holotype), collector unknown, FKCP. No other material.

ETYMOLOGY. The name is based on characteristically dark coloration.

DESCRIPTION. Total length of the female holotype is 64.8 mm. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Pectinal teeth number 20. Habitus is shown in Fig. 27.

The base color is uniformly black with brown spots. The telson and fingers of pedipalps are reddish brown, the manus of pedipalps is brown, the femur and patella of legs are brownish black, and the metatarsus and tarsus are yellowish brown.

The carapace lacks keels but bears large granules.

The movable fingers of pedipalps bear nine rows of granules, and the ninth row terminates in one external and no internal granule. The fixed fingers of pedipalps bear eight rows of granules, and the eighth row terminates in one external and no internal granule.

The seventh mesosomal segment bears four ventral keels. The first metasomal segment has a total of 10 keels, the second through fourth segments have eight keels, and the fifth segment has five keels.

AFFINITIES. The described features distinguish *B. melanicus* sp. n. from all other species of the genus. They are recounted in the key below.

B. melanicus sp. n. is closest to *B. buettneri*, from which it differs in coloration. *B. melanicus* sp. n. has the femur and patella of pedipalps black, whereas in *B. buettneri* the patella of pedipalps is black and the femur of pedipalps reddish brown to yellow. *B. melanicus* sp. n. has the fingers of pedipalps lighter than the manus, whereas *B. buettneri* has them darker than the manus.

The morphological similarity of these species makes it likely that they are similar also in sexual dimorphism, i. e. the male of *B. melanicus* sp. n. probably does not have metasomal segments broader than the female, but does have a broader manus of pedipalps.

***Babycurus multisubaculeatus* sp. n.**

(Figs 28, 37, Tables 1–3)

TYPE LOCALITY AND REPOSITORY. Somalia, Afgooye env.; FKCP.

TYPE MATERIAL. Somalia Afgooye env., X. 1980, 1FA (holotype) 1MA (paratype), collector unknown, FKCP. No other material.

ETYMOLOGY. Named for the presence of tubercles on the telson.

DESCRIPTION. Total length of the female holotype is 41.1 mm and that of the male paratype is 47.4. In contrast to female, the male has a broader manus of pedipalps and posteriorly more widening metasomal segments (Tab. 1). Measurements of the carapace, telson, segments of the metasoma and

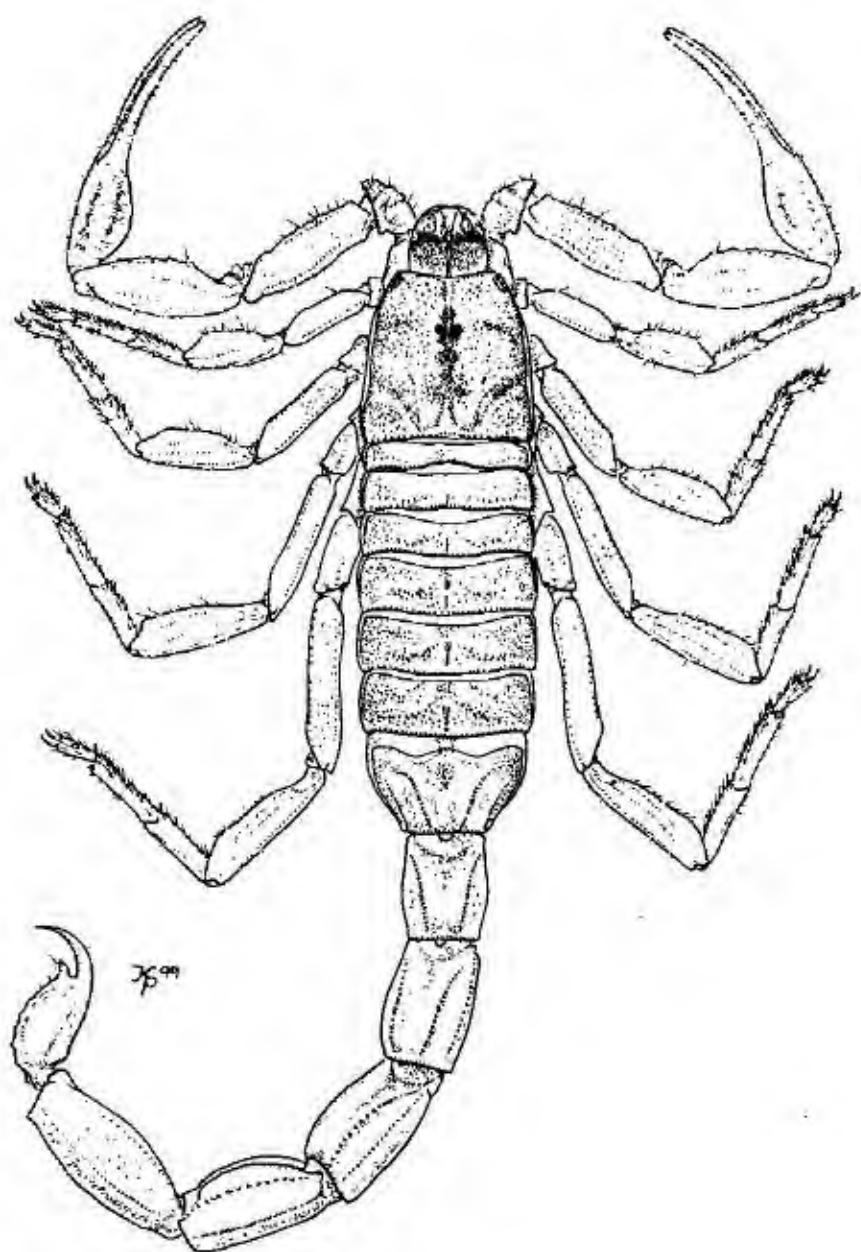


Fig. 27. *Babycurus melanicus* sp. n., female holotype, dorsal aspect.

segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Pectinal teeth number 19 (female) and 20 (male). Habitus of holotype is shown in Fig. 28. The fingers of pedipalps are not flexed.

The base color is uniformly reddish brown. The manus of pedipalps is yellowish brown, lighter than the fingers. The femur of the legs is reddish brown, turns from reddish brown to yellowish brown on the patella, and the metatarsus and tarsus are yellowish brown. The mesosoma and pedipalps are ventrally yellow to yellowish brown.

The carapace lacks keels but bears large granules.

The movable fingers of pedipalps bear 10 rows of granules, and the 10th row terminates in one external and no internal granule. The fixed fingers of pedipalps bear nine rows of granules, and the ninth row terminates in one external and no internal granule.

The seventh mesosomal segment bears four ventral keels. The first metasomal segment has a total of 10 keels, the second through fourth segments have eight keels, and the fifth segment has five keels. All metasomal segments are dorsally as well as ventrally granulated, with the largest and most closely spaced granules on the fifth segment. On the telson below the subaculear tooth is a somewhat smaller tooth-like tubercle, and two more symmetrical tubercles are situated anterolaterally, one on each side (Fig. 37). Both the subaculear tooth and the accessory tubercles are apically black.

AFFINITIES. The described features distinguish *B. multisubaculeatus* sp. n. from all other species of the genus. They are recounted in the key below.

B. multisubaculeatus sp. n. is closest to *B. wituensis*, from which it differs in having 10 rows of granules on the movable fingers of pedipalps (*B. wituensis* has only nine rows). Another difference is the presence of accessory tubercles on the telson of *B. multisubaculeatus* sp. n. This character is unique in the genus (Fig. 37).

COMMENTS. The reason why the female is designated the holotype is that the male has the tips of the fingers of pedipalps broken off and that in this paper the rows of granules on the fingers are regarded as a major character.

Babycurus ornatus Werner, 1936

(Figs 9, 31, Tables 1-3)

Babycurus ornatus Werner, 1936: 181; Vachon, 1940b: 179; Lamoral & Reynders, 1975: 498; Kovařík, 1998: 104.

TYPE LOCALITY AND REPOSITORY. Portugiesisch-Ostafrika, Farm Nangororo bei Porto Amelia (new designation), ZMUH.

TYPE MATERIAL EXAMINED. Mozambique: Farm Nangororo bei Porto Amelia, 1927, 2F1 juv A (lectotype and paralectotypes Nos 1-2), ZMUH No. 30; Porto Amelia, 1927, 2F1 juv A (paralectotypes Nos 4-6), ZMUH No. 43; Porto Amelia, 1927, 2FA (paralectotypes Nos 7-8), ZMUH No. 19; ca 70 km westl der Küste, Landschaft Mocimbe, I-31.VIII 1926, 1FA (paralectotype No. 3), ZMUH No. 22.

DIAGNOSTIC CHARACTERS. Total length of females is 30-38 mm. The movable fingers of pedipalps bear seven rows of granules (Fig. 9). The first six rows terminate in one external granule each, which is absent in the seventh row (Fig. 9). The fixed fingers of pedipalps bear six rows of granules, the short apical row is absent. Pectinal teeth number 15-18 (known only for females). The carapace and the dorsal surface of the mesosoma bear numerous granules, however on the mesosomal segments the granular pattern is interrupted by smooth, symmetrical facets. The seventh mesosomal segment lacks ventral keels. The first and second metasomal segments have 10 keels (the second segment sometimes has two keels merely indicated by a few granules), the third and fourth segments have

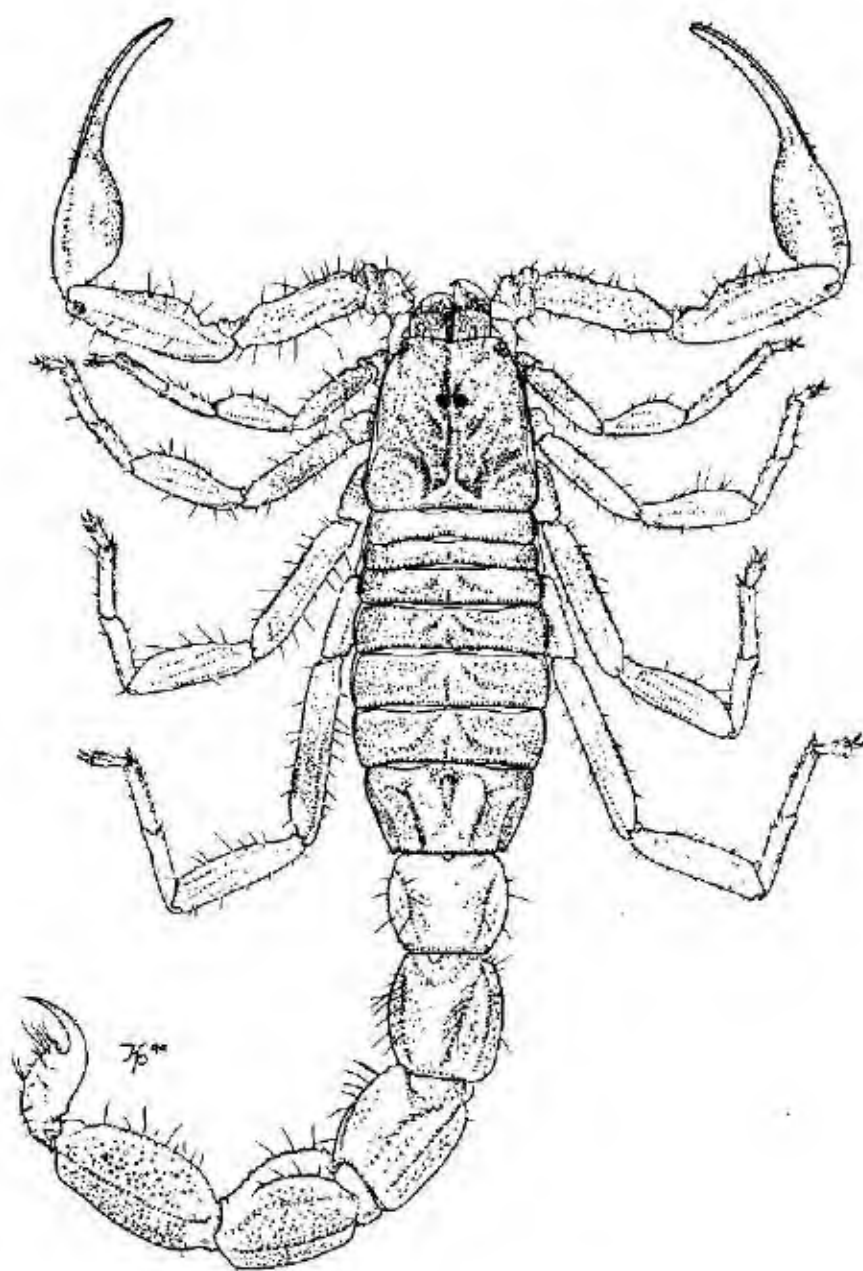


Fig. 28. *Babycurus multisubaculeatus* sp. n., female holotype, dorsal aspect.

eight keels, and the fifth segment has five conspicuous keels composed of equal-sized granules. The first metasomal segment is wider than long (Tab. 1). The dorsal keels on the third and sometimes also the second metasomal segments terminate in a pronounced tooth. The telson is very narrow (Fig. 31), with a ventral keel.

The color is yellowish brown, with black spots and bands. The carapace bears a conspicuous dark anterior triangle (similarly to the genus *Lychas*) and dark spots which posteriorly combine into four irregular bands and continue through all mesosomal segments. The chelicerae are reticulated. The femur of pedipalps has dark spots, the patella is entirely dark (sometimes with a few yellowish-brown spots), the manus of tibia is yellow, and the fingers are dark brown. The legs are spotted. The first through fourth metasomal segments are reddish brown with small black spots, the fifth segment is brownish black (anteriorly may be reddish brown with small black spots), and the telson is reddish brown.

COMMENTS. This species is based on nine specimens deposited at ZMUH. Since Werner (1936: 181) did not select a holotype, upon examination I have designated the series as the lectotype and paralectotypes Nos 1–8, which also fixes the type locality.

DISTRIBUTION. Mosambique (Werner 1936: 181).

Babycurus pictus Pocock, 1896

(Fig. 32, Tables 1–3)

Babycurus pictus Pocock, 1896: 426. Pocock, 1898: 430. Fage & Simon, 1936: 303.

Babycurus centrurimorphus (in part) Kracelin, 1896: 124, Kracelin, 1899: 63, Birula, 1915: 16, Birula, 1915: 119, Probst, 1973: 325. Kovarik, 1998: 104.

Buthus (*Rhoptrurus*) *centrurimorphus* Pocock, 1890: 122.

Babycurus butneri (in part) Lamoral & Reynders, 1975: 496–7.

TYPE LOCALITY AND REPOSITORY. Mount Kenia, East Afrika, Athi Plains, BMNH.

TYPE MATERIAL EXAMINED. Kenya: Athi Plains, IFA (holotype), leg. G. W. Gregory, BMNH No. 1893.11.9.3.

ADDITIONAL MATERIAL EXAMINED. Angola: Mucozo, 5.V.1959, JMA, leg. H. Oboussier, ZMUH No. 68. Kenya: Mombasa, 31.V.1901, 2FA, ZMUH, labeled as *Babycurus centrurimorphus*, Voi (Tsavo), 27.III–4.IV.1997, 1ME, leg. M. Snižek, FKCP. Mwingi env., 4.XII.1997, 1FE, leg. M. Snižek, FKCP. Tanzania: D.O. Afrika, Hohenlobe Graben, 19–22.V.1911, IFA, leg. Dr. Obst, ZMUH.

DIAGNOSTIC CHARACTERS. Total length is 40–56.7 mm. In contrast to female, the male has a broader manus of pedipalps (Tab. 1). For habitus see fig. 1 in Pocock 1896. The movable fingers of pedipalps bear seven rows of granules (Fig. 3). The fixed fingers of pedipalps bear six rows of granules, and the sixth row has one external granule. Pectinal teeth number 19–20. The seventh mesosomal segment is ventrally smooth, without keels. The keels of the second and third metasomal segments are sometimes poorly developed or absent, even in females. All keels are composed of minute, equal-sized, and evenly spaced granules. Both sexes have the fourth and fifth metasomal segments smooth, without keels, or rarely with poorly indicated crests lacking granules.

The color is yellow to yellowish green, with three black bands on the mesosoma. The metasoma is light yellow with dark spots on the ventral surface. The pedipalps are yellow with dark fingers.

COMMENTS. *B. pictus* is based on a single female, which I have examined. Kracelin (1896: 124) incorrectly synonymized this species with *B. centrurimorphus*, which is understandable because separation of these two species without adequate material is at best difficult. However, there can be no doubt that *B. pictus* is a valid species with sexual dimorphism and the shape of pedipalps (especially the tibia, Figs 32–34, Tab. 1) different from *B. centrurimorphus*. Moreover, *B. pictus* does not reach the size of *B. centrurimorphus*.

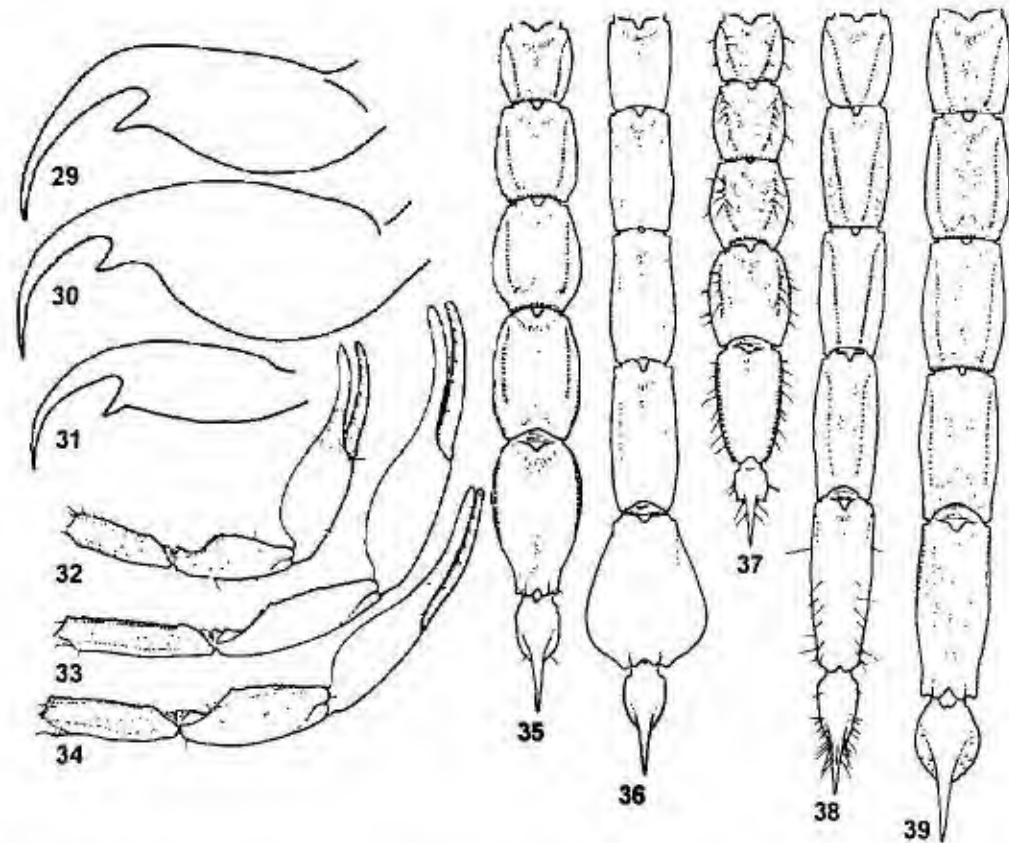
A male of *B. pictus* from Angola is larger than other examined specimens, and differs from the males collected in Kenya in having smooth keels on the manus of pedipalps. It is not a separate species, but a study of more specimens could reveal it to be a subspecies.

DISTRIBUTION. Angola (first report), Kenya (Pocock 1896: 426), Tanzania (Pocock 1898: 430).

***Babycurus somalicus* Hirst, 1907**

(Figs 10, 21, Tables 1–3)

Babycurus somalicus Hirst, 1907: 208; Vachon, 1940b: 180; Moriggi, 1941: 93; Lamoral & Reynders, 1975: 498; El-Honnawy, 1992: 97, 111; Kovarik, 1998: 104.



Figs 29–37. Figs 29–31. Telson. Figs 32–34. Pedipalp. Figs 35–39. Metasoma. Figs 29–30. *B. kirki* (Pocock). Fig. 29. *B. neglectus* Kraepelin, female lectotype. Fig. 30. *B. kirki* (Pocock), FKCP male. Fig. 31. *B. ornatus* Werner, female lectotype. Fig. 32. *B. pictus* Pocock, FKCP male. Figs 33–34. *B. centrurimorphus* Karsch. Fig. 33. *B. centrurimorphus* Karsch, FKCP male. Fig. 34. *B. centrurimorphus* Karsch, FKCP female. Fig. 35. *B. wiluensis* Kraepelin, ZMHB male. Fig. 36. *B. ansorgei* Hirst, FKCP male. Fig. 37. *B. multisubaculeatus* sp. n., female holotype. Fig. 38. *B. exquisitus* Lowe, male holotype. Fig. 39. *B. melanicus* sp. n., female holotype.

TYPE LOCALITY AND REPOSITORY. Berbera and Durbar, Somaliland; BMNH.

TYPE MATERIAL EXAMINED. *Somalia*. Wagar Mts, behind Berbera, 2FA (holotype and paratype), purchased by W. Bury, BMNH No. 1906.3.25.126.

DIAGNOSTIC CHARACTERS. Total length of the female holotype is 48.2 mm. The male is not known. The movable fingers of pedipalps bear seven rows of granules (Fig. 10), and the seventh row has one external and no internal granule. The fixed fingers of pedipalps bear seven row of granules, and the seventh row lacks external and internal granules. For position and distribution of trichobothria on the tibia of pedipalps see Fig. 21. Pectinal teeth number 19–20.

The manus of pedipalps is smooth, with effaced keels. The patella of pedipalps is also smooth, with well developed keels some of which are covered by minute granules.

The seventh mesosomal segment bears four ventral keels. Metasomal keels are always present and are composed of minute, rounded, equal-sized, and evenly spaced granules. The telson is smooth, with only a weakly indicated ventral keel and several long hairs in proximity of the subaculear tooth.

After the long years in alcohol, the color is uniformly dark brown.

COMMENTS. This species is based on two females collected by Mr. G. W. Bury. Hirst (1907: 209) related *B. somalicus* to *B. zambonellii*, from which he distinguished it by, inter alia, the presence of granulated keels on the manus of pedipalps.

DISTRIBUTION. *Somalia* (Hirst 1907: 209).

Babycurus subpunctatus Borelli, 1925

(Fig. 22, Tables 1–3)

Babycurus subpunctatus Borelli, 1925: 318; Vachon, 1940b: 179; Moriggi, 1941: 92; Lamoral & Reynders, 1975: 498; El-Hennawy, 1992: 97, 111; Kovarik, 1998: 104.

TYPE LOCALITY AND REPOSITORY. Cuban Cubu, *Somalia italiana*; MCSN.

TYPE MATERIAL EXAMINED. *Somalia*. Cuban Cubu, IX 1923, 1FA (holotype), leg. S. Patrizi. No other material.

DIAGNOSTIC CHARACTERS. Total length of the female holotype is 32.1 mm. The male is not known. The movable fingers of pedipalps bear seven rows of granules (Fig. 10), and the seventh row has one external and no internal granule. The fixed fingers of pedipalps bear seven row of granules, and the seventh row lacks external or internal granule. For position and distribution of trichobothria on the tibia of pedipalps see Fig. 22. Pectinal teeth number 16.

The seventh mesosomal segment bears four poorly discernible granulated ventral keels. Metasomal keels are always present and are composed of minute, rounded, equal-sized, and evenly spaced granules. The ventral keels are discernible but not pronounced. The telson is smooth, with only a weakly indicated ventral keel and a dense cover of long hairs in proximity of the subaculear tooth.

COMMENTS. This species is based on a single female. It appears to be closely related to *B. somalicus*, *B. zambonellii*, and *B. exquisitus*.

DISTRIBUTION. *Somalia* (Borelli 1925: 320).

Babycurus ugartei sp. n.

(Tables 1–3)

TYPE LOCALITY AND REPOSITORY. Nigeria, Plateau Lafia env.; FKCP.

TYPE MATERIAL EXAMINED. Nigeria: Plateau Lafia div., V 1988, IFA (holotype), leg. B. Duran, FKCP. No other material.

ETYMOLOGY. Named after Alfredo Ugarte, a Chilean entomologist and my friend.

DESCRIPTION. Total length of the female holotype is 27.4 mm. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps, and numbers of pectinal teeth are given in Table 1. Pectinal teeth number 15 and 16. The fingers of pedipalps are not flexed.

The base color is yellow with brown spots. The manus of pedipalps is yellow, lighter than the fingers. The patella of pedipalps is darkish black, as is the adjacent third of femur; the other two-thirds of femur are yellow. The carapace and legs are yellow with brown spots. The mesosoma is yellow with three black bands. The first four metasomal segments and telson are yellow with a few small dark spots, but the fifth segment is black. The chelicerae are reticulated.

The carapace lacks keels but bears large granules.

The movable fingers of pedipalps bear seven rows of granules (Fig. 9). The first six rows terminate in one external granule each, which is absent in the seventh row (Fig. 9). The fixed fingers of pedipalps bear six rows of granules, the short apical row is absent.

The seventh mesosomal segment bears four ventral keels. The first metasomal segment has a total of 10 keels, the second through fourth segments have eight keels, and the fifth segment has five conspicuous keels composed of equal-sized granules. All metasomal segments are dorsally as well as ventrally granulated. The telson is narrow, with a ventral keel and numerous long hairs.

AFFINITIES. The described features distinguish *B. ugartei* sp. n. from all other species of the genus. They are recounted in the key below.

B. ugartei sp. n. is closest to *B. ornatus*, from which it differs in having four ventral keels on the seventh mesosomal segment (*B. ornatus* has this segment devoid of keels) and in geographic distribution.

Babycurus wituensis wituensis Kraepelin, 1913

(Figs 23, 35, Tables 1–3)

Babycurus wituensis Kraepelin, 1913: 181; Birula, 1915: 17; Borelli, 1925: 323; Vachon, 1940b: 180; Page, 1946: 259; Probst, 1973: 324; Lamiel & Reynders, 1975: 499; Moritz & Fischer, 1980: 326; Kovarik, 1998: 104.

TYPE LOCALITY AND REPOSITORY. British-Ostafrika, Pokomonie (new designation); ZMHB.

TYPE MATERIAL EXAMINED. Kenya: Pokomonie, 1896, IFA (lectotype), leg. G. Denhardt, ZMHB No. 8182, Wange bei Lamu, 1896, IMA (paralectotype No. 1), leg. G. Denhardt, ZMHB.

ADDITIONAL MATERIAL EXAMINED. Kenya: Wange bei Lamu, VI–IX.1896, IMA, leg. Tiede, ZMHB No. 8185/9197.

DIAGNOSTIC CHARACTERS. Total length is 45–56.1 mm. In contrast to female, the male has a broader manus of pedipalps. Both the movable and fixed fingers of pedipalps bear nine rows of granules (Figs 11–12). For position and distribution of trichobothria on the tibia of pedipalps see Fig. 23. Pectinal teeth number 21–22. The seventh mesosomal segment bears four ventral keels. The dorsal surface of the mesosoma is very sparsely granulated and bears an incomplete median keel. Metasomal keels are always present, but in the male they are less pronounced on the fifth metasomal segment.

The color is muddy yellow, only the fingers of pedipalps are dark and the mesosoma has three faint dark bands (Kraepelin, 1913: 181; Probst, 1973: 324).

COMMENTS. This species is based on two specimens, which I have designated as the lectotype (ZMHB female) and paralectotype No. 1 (ZMUH male). This also fixes the type locality, Pokomonie.

and Wanga, Kenya, were repeatedly listed as places in Tanzania, where this species is not known to occur.

When describing the species, Kraepelin was not aware of another ZMHB specimen collected the same year and at the same locality as the paralectotype No. 1. This specimen (see Additional material examined) is important, because its length of 56.1 mm (Tab. 1) shows a marked variation in size. So far the type material indicated that the species reaches only about 45 mm (Probst, 1973: 324).

The original color of the types has been lost due to long preservation in alcohol, and it is now yellowish brown.

DISTRIBUTION: Kenya (Kraepelin 1913: 182, Probst 1973: 325).

***Babycurus wituensis taramassoi* Borelli, 1919 stat. n.**

(Figs 11–12, 24–25, 40, Tables 1–3)

Babycurus taramassoi Borelli, 1919: 369, Borelli, 1925: 323, Caporaccio, 1936: 140, Vachon, 1940b: 180, Moriggi, 1941: 92, Lamoral & Reynders, 1975: 498, El-Hennawy, 1992: 97, 111, Kovařík, 1998: 104.

¹ *Babycurus johnstoni ochraceus* Masi, 1912: 105 (TL Benadir, Mogadiscio, Somalia, ?), Moriggi, 1941: 92, 111, Hennawy, 1992: 97, 111, Kovařík, 1998: 104, syn. n.

Babycurus patrizi Borelli, 1925: 320 (TL Gumbo, Somalia, MCSN), Caporaccio, 1936: 140, Vachon, 1940b: 180, Moriggi, 1941: 92, Lamoral & Reynders, 1975: 498, El-Hennawy, 1992: 97, 111, Kovařík, 1998: 104, syn. n.

Babycurus crassimanus Caporaccio, 1936: 140 (TL Belet Amin, Somalia, MCSN), Vachon, 1940b: 180, Moriggi, 1941: 92, Lamoral & Reynders, 1975: 497, El-Hennawy, 1992: 97, 111, Kovařík, 1998: 104, syn. n.

TYPE LOCALITY AND REPOSITORY: Afgoi, Somalia, MCSN.

TYPE MATERIAL EXAMINED: **Somalia** Gumbo, VII 1923, 1F(im)A (holotype of *Babycurus patrizi*), leg. S. Patrizi, MCSN; Belet Amin, IMA (holotype of *Babycurus crassimanus*), VI 1924, MCSN.

ADDITIONAL MATERIAL EXAMINED: **Ethiopia** Genu Gola, Arba Minch, 2–3 V 1997, 2MIF(im)E, leg. Werner, FKCP. **Somalia** Belet Amin, 21 juvsA, leg. Patrizi, det. Caporaccio as *B. taramassoi*, MCSN; Ola Uager, VIII 1934, 3FA, leg. Patrizi, det. Caporaccio as *B. taramassoi*, MCSN; Belet Amin, VII 1934, 1MIF2juvsA, leg. Stegmann & Puccinotti; MZUF, Afgoi, 13 VIII 1959, 1FimA, 2 IX 1959, 1FA, MZUF, Giohar foresta, 3 VIII 1968, 1FA, Giohar sim, 5 VIII 1968, 1juvA, 11 IX 1968, 1juvA, MZUF, Giohar, IX 1969, 1juvA, 8 VIII 1970, 1FA, MZUF; Ola Uager (Campo), 11–12 VII 1970, 1FimA, MZUF; Ola Uager (Oltra Guba), 15 VII 1970, 2F2im 19juvs before first ecdysisA, MZUF; Ola Uager, 12 VIII 1970, 1juvA, 15–19 VIII 1970, 17juvsA, MZUF; Gelib, 1970, 1FA, leg. Tarabini, MZUF; Afgoi, 14 IV 1976, 1FimA, leg. Fagetto, MZUF; Afgoye env., X 1980, 1M3FA 1FE, FKCP.

DIAGNOSTIC CHARACTERS: Total length is 55–74 mm. Habitus is shown in Fig. 27. In contrast to female, the male has a broader manus of pedipalps (Figs 24–25, Tab. 1) and proximally flexed fingers of pedipalps (Figs 24–25). The movable fingers of pedipalps bear nine rows of granules (Figs 11–12), and the ninth row has one external granule and no (Fig. 11) or one (Fig. 12) internal granule. The fixed fingers of pedipalps bear eight rows of granules (but only seven rows were found in one specimen), and the eighth row has one external granule and no or one internal granule. For position and distribution of trichobothria on the tibia of pedipalps see Figs 24–25. Pectinal teeth number 21–28.

The manus of pedipalps is smooth, with very sparse granules or devoid of them, and without keels, however, three inconspicuous keels may be present in some females.

The seventh mesosomal segment is ventrally smooth, with four usually well defined keels. On the fourth and fifth segments the keels are poorly defined, particularly in males. These two segments are ventrally more granulated, also particularly in males. The telson is granulated as well.

The mesosoma is dorsally covered by granules that may be minute or fairly large and closely or widely spaced, and the posterior margin of each segment bears a row of larger granules.

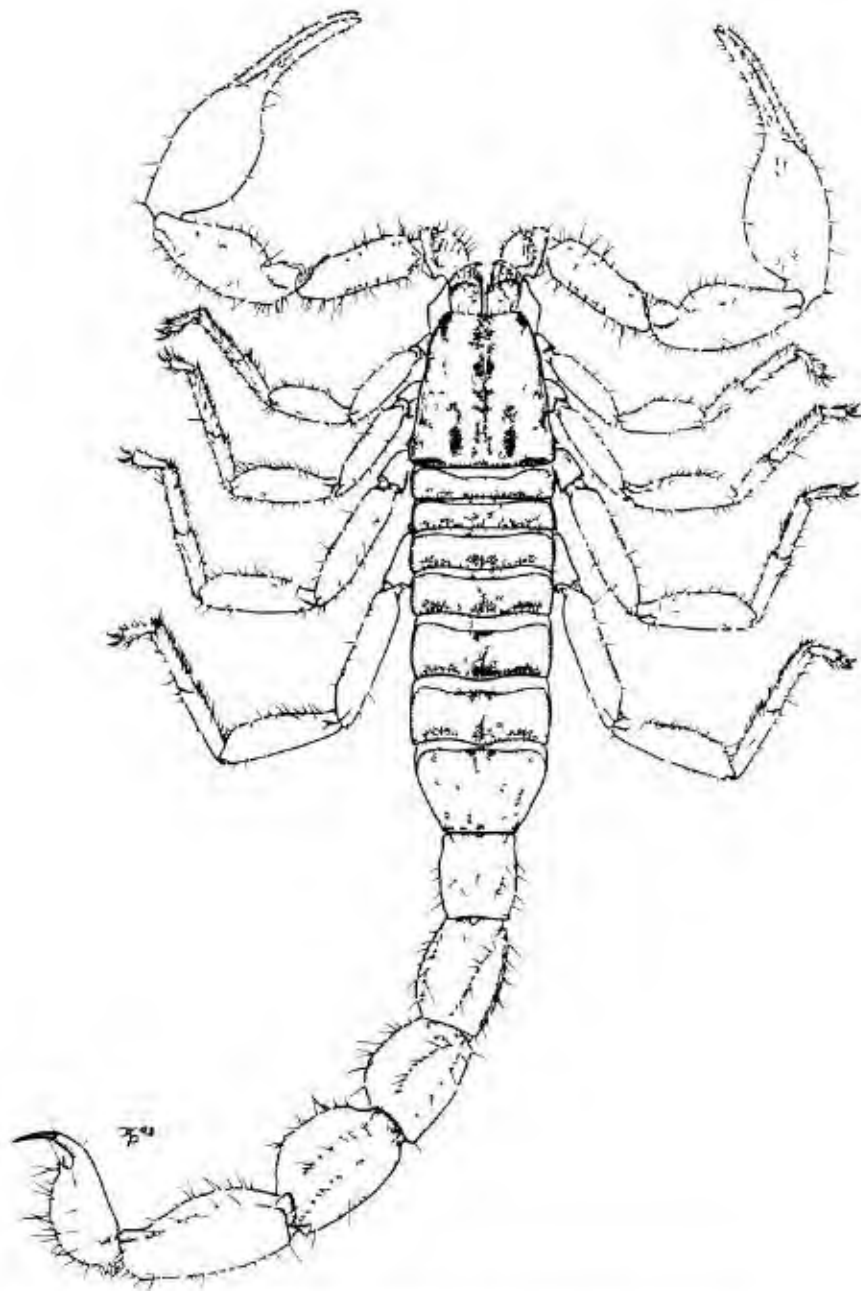


Fig. 40. *Babycurus watainensis taramayssor* Borelli, FKCP male from Ethiopia, dorsal aspect

The color is light brown to yellow with black spots that are more pronounced in immature specimens, which are spotted also on the patella of pedipalps, metasomal segments, and telson. The fingers of pedipalps are always darker than the manus. The chelicerae are reticulated.

COMMENTS. This species is rather variable and notable differences can be found between immature females, mature females, and males. Mature individuals of both sexes have the first metasomal segment much narrower than the following segments (Tab. 1), whereas in immature specimens the first segment is as wide as the others (see the holotype of *B. patrizii*, an immature female which Borelli (1925: 320) mistook for a male). Adult males have the fourth and fifth metasomal segments wider than the preceding segments, and, furthermore, they have a broader manus of pedipalps and flexed fingers of pedipalps (see holotype of *B. crassimanus* Caporiacco (1936: 140), Table 1, and Fig. 25).

These differences confused Caporiacco (1936: 140–141), who out of 15 specimens from Belet Amin identified 14 as *B. taranassoi* without determining their sex (I examined these specimens and found them to be females and juveniles), and described the remaining specimen, an adult male, as a new species, *B. crassimanus*.

All specimens have nine rows of granules on the movable fingers of pedipalps, however the ninth row may lack or have one internal granule (Figs 11–12). The only specimen which has the internal granule on both movable fingers is the holotype of *B. patrizii*. However, this character is taxonomically worthless, because several other specimens have the internal granule present on one finger and absent on the other.

Masi (1912: 105) based *Babycurus johnstoni ochraceus* on specimens from Benadir, Mogadiscio, Somalia. According to the title of Masi's paper the types ought to be in the Museo Zoologico di Roma, but Dr. Vomero has informed me that they are not there and their whereabouts are unknown. The area of occurrence makes it very unlikely that *B. johnstoni ochraceus* could be a subspecies of *B. johnstoni* (now *B. huettneri*). I suspect *B. johnstoni ochraceus* to be a synonym of *Babycurus wituensis taranassoi*, because it is the only species of the genus with 24 teeth in the pecten (Tab. 3 and Masi 1912: 106), and it is known to occur in Somalia (Tab. 2 and Masi 1912: 105). Nothing more can be said without the type specimens at hand.

I have not been able to find a character that would allow me to separate this species from *B. wituensis* occurring in Kenya. Small differences in proportions of metasomal segments are not at all unusual in populations of *Babycurus*. Apart from geographic distribution, the only difference is the number of pectinal teeth in males, 21 or 22 in *B. wituensis* and 24–28 in *B. w. taranassoi*; however, the females of *B. w. taranassoi* have 21–26 pectinal teeth. I therefore conclude that *B. taranassoi* is a subspecies of *B. wituensis*.

DISTRIBUTION. Ethiopia (first record), Somalia (Borelli 1919: 371).

Babycurus zambonellii Borelli, 1902

(Figs 13, 26, Tables 1–3)

Babycurus zambonellii Borelli, 1902: 1. Kraepelin, 1913: 181; Birula, 1917b: 215; Moriggi, 1941: 92; Caporiacco, 1947: 232; Probst, 1973: 329; Lamoral & Reynders, 1975: 499; El-Hennawy, 1992: 97, 111; Sissom, 1994: 5; Kovarik, 1998: 104.

Babycurus zambonellii Vachon, 1940b: 180.

TYPE LOCALITY AND REPOSITORY. Chenafena, Eritrea; MIZT.

TYPE MATERIAL EXAMINED. Eritrea: Chenafena, IMA (holotype), leg. Zambonelli, MIZT No. Scf8(ex580).

ADDITIONAL MATERIAL EXAMINED. Yemen Arab Republic: Sana'a, VI–VII 1981, IFA, leg. Giugno-Lupho, det. W. D. Sissom, MZUF.

DIAGNOSTIC CHARACTERS. Total length is 48.6–51.2 mm. In contrast to female, the male has a broader manus of pedipalps (Tab. 1), broader metasomal segments, and larger pectinal teeth. The fingers of pedipalps are not flexed in either sex. The movable fingers of pedipalps bear eight rows of granules (Fig. 13), and the eighth row has one external and no internal granule (Fig. 13). The fixed fingers of pedipalps bear eight rows of granules, and the eighth row lacks external or internal granule. For position and distribution of trichobotria on the pedipalps see Fig. 26 and figs 3–5 in Sissom (1994: 6). Pectinal teeth number 18–19.

The manus of pedipalps is smooth, without keels (male), or with three smooth, blunt keels devoid of granules (females).

The seventh mesosomal segment is ventrally smooth and bears four incomplete keels. Metasomal keels are always present and are composed of minute, equal-sized, rounded, and evenly spaced granules. Males have the fourth and fifth metasomal segments granulated. The telson bears long hairs; it is densely hirsute in females and probably less densely hirsute in males.

DISTRIBUTION. Eritrea (Borelli 1902: 3), Yemen (Sissom 1994: 5).

Key to *Babycarus* species

- 1 Movable finger of pedipalps with 9–10 rows of granules (Figs 4–5) 2
- Movable finger of pedipalps with 7–8 rows of granules (Figs 8–10) 5
- 2 Movable finger of pedipalps with 10 rows of granules (Fig. 5) 3
- Movable finger of pedipalps with 9 rows of granules (Fig. 4) 17
- 3 Total length of adult between 89 and 110 mm. Tenth row of granules on movable finger with one or very rarely two external granules *B. gigas* Kraepelin
- Total length of adult less than 70 mm 4
- 4 Tenth row of granules on movable finger without external granules. Ventral surface of fifth metasomal segment smooth, without discernible granules *B. kirki* (Pocock)
- Tenth row of granules on movable finger with one external granule. Ventral surface of fifth metasomal segment with numerous large granules *B. multisubaculeatus* sp. n.
- 5 Movable finger of pedipalps with 7 rows of granules (Fig. 9) 6
- Movable finger of pedipalps with 8 rows of granules (Fig. 8) 12
- 6 Seventh row of granules on movable finger without external granule (Fig. 9) 7
- Seventh row of granules on movable finger with one external granule (Fig. 10) 8
- 7 Seventh mesosomal segment bears four ventral keels *B. ugartei* sp. n.
- Seventh mesosomal segment lacks ventral keels *B. ornatus* Werner
- 8 Rows of granules on movable finger with two external granules (apart from terminal granule) (Figs 2–3) 10
- Rows of granules on movable finger with one external granule (apart from terminal granule) (Fig. 10) 9
- 9 Pectinal teeth number 16. Metasoma very slender, fifth metasomal segment with length to width ratio higher than 2.6 *B. subpunctatus* Borelli
- Pectinal teeth number 19–20. Metasoma not very slender, fifth metasomal segment with length to width ratio lower than 2.4 *B. somaliensis* Hirst
- 10 Fifth metasomal segment of male markedly wider (Fig. 36, Tab. 1) *B. ansorgei* Hirst
- Fifth metasomal segment of male as wide as, or only slightly wider than, preceding segment 11
- 11 Segments of pedipalps notably long, especially in male. Tibia length to width ratio higher than 4.2 *B. centrurimorphus* Karsch
- Segments of pedipalps not notably long. Tibia length to width ratio lower than 4.0 *B. pictus* Pocock
- 12 Eighth row of granules on movable finger with one external granule (Fig. 13) 13
- Eighth row of granule on movable fingers with two external granules (Fig. 8) 16
- 13 Rows of granules on movable finger with one external granule (apart from terminal granule) (Fig. 13) 14
- Rows of granules on movable finger with two external granules (apart from terminal granule) (Figs 2–3) 15
- 14 Ventral surface of fifth metasomal segment granulated in male. Total length more than 45 mm. Pectinal teeth number 18–19 *B. zambonelli* Borelli
- Ventral surface of fifth metasomal segment smooth in male. Total length less than 40 mm. Pectinal teeth number 21–22 *B. exquisitus* Lowe
- 15 Fifth metasomal segment of male markedly wider (Fig. 36, Tab. 1) *B. ansorgei* Hirst

- Fifth metasomal segment of both sexes as wide as, or only slightly wider than, the preceding segment *B. jacksoni* (Pocock)
- 16 Fifth metasomal segment entirely smooth, without keels (keels rarely indicated in males) *B. kirki* (Pocock)
- Fifth metasomal segment with five keels in both sexes *B. buettneri* Karsch
- 17 Ninth row of granules on movable finger of pedipalps with external granules (Fig. 7) 18
- Ninth row of granules on movable finger of pedipalps without external granules (Fig. 4) *B. buettneri* Karsch
- 18 Ninth row of granules on movable finger of pedipalps with one external granule (Fig. 11) 19
- Ninth row of granules on movable finger of pedipalps with two external granules (Figs 7-8) *B. kirki* (Pocock)
- 19 Fifth metasomal segment length to width ratio higher than 2.2 *B. melanicus* sp. n.
- Fifth metasomal segment length to width ratio lower than 2 20
- 20 Pectinal teeth of male number 21-22. Total length of adult between 45 and 57 mm *B. wituensis wituensis* Kraepelin
- Pectinal teeth of male number 24-28. Total length of adult between 55 and 74 mm *B. wituensis turamassoi* Borelli

Checklist of the genus *Babycurus* Karsch, 1886

- Babycurus ansorgei* Hirst, 1911
 = *Babycurus crassicaudatus* Roewer, 1952: 28 syn. n.
- Babycurus buettneri* Karsch, 1886
 = *Babycurus johnstoni* Pocock, 1896: 429 syn. n.
- Babycurus centrurimorphus* Karsch, 1886
- Babycurus exquisitus* Lowe, 2000
- Babycurus gigas* Kraepelin, 1896
- Babycurus jacksoni* (Pocock, 1890)
- Babycurus kirki* (Pocock, 1890)
 = *Babycurus neglectus* Kraepelin, 1896
- Babycurus melanicus* sp. n.
- Babycurus multisubaculeatus* sp. n.
- Babycurus ornatus* Werner, 1936
- Babycurus pictus* Pocock, 1896
- Babycurus somalicus* Hirst, 1907
- Babycurus subpunctatus* Borelli, 1925
- Babycurus ugartei* sp. n.
- Babycurus wituensis wituensis* Kraepelin, 1913
- Babycurus wituensis turamassoi* Borelli, 1919 stat. n.
 = ? *Babycurus johnstoni ochraceus* Masi, 1912 syn. n.
 = *Babycurus patrizii* Borelli, 1925 syn. n.
 = *Babycurus crassimanus* Caporaccio, 1936 syn. n.
- Babycurus zambonellii* Borelli, 1902

DISCUSSION

Examination of specimens has revealed a relatively high level of intraspecific variation in overall length and in the shape of metasomal and pedipalp segments. A good example of this is *B. wituensis* (see above).

The revision has revealed sexual dimorphism that in a great majority of species is manifested by a broader manus of pedipalps and a slight proximal flexure of the fingers of pedipalps in males. A broader manus is not present only in the male of *B. centrurimorphus*, which in contrast to the female has the individual segments of pedipalps longer (Figs 33-34). Another difference between the sexes of some species (*B. ansorgei*, *B. wituensis*) can be seen in the widening of posterior metasomal segments, which characterizes males. Because of these features, species identification is usually easy for adult males and difficult for adult females, and it is sometimes impossible to unequivocally identify immature specimens. The availability of a male is therefore more important in

this genus than in many other genera of scorpions, which is well apparent from the above synonymization of *B. crassicaudatus* Roewer, 1952 that is easily recognized on the shape of the fifth metasomal segment (Fig. 36), but was originally described as *H. ansorgei* Hirst, 1911 based on the female which lacks this feature.

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BOOK REVIEW

FULLER E. *The Great Auk*. Harry N. Abrams, New York, 1999, 448 pp., format 250×305 mm. Price 48 GBP, ISBN 0-8109-6391-4

The book begins "The Great Auk has always been particularly fascinating. Quite why is difficult to say. Certainly, it has much to do with the fact that the bird is extinct." Indeed, Recently, tens of species of birds vanish out from our planet without attracting much attention. But some famous cases of extermination of birds species by human cruelty have particularly touch our hearts, such as the Dodo (*Raphus cucullatus*) on Mauritius, Passenger Pigeon (*Ectopistes migratorius*) in the United States and, of course, the eponymous species (*Alca impennis*).

The prologue of the book is poignant and eloquent. "It is the morning of the third day of June in the year eighteen hundred and forty-four. A fishing boat has come close to the remote Icelandic island of Hlíðey. Despite the season, a thin mist hangs over the island and the sun shines only palely through the clouds, hardly managing to warm the stones. Three men, Sigurdr Isleifsson, Jon Brandsson and Ketil Ketilsson, have struggled ashore from an eight-oared boat that waits, with the rest of the crew, for their return. As they clamber over the rocks and stones, hundreds of seabirds rise up and scuttle from their rough, lurching path, flapping their way to safety. One of the men gives a call and points through the swirling mist as it blows in off the sea. Two birds, larger than the others, struggle up and waddle clumsily and frantically away, moving as fast as their short legs will carry them. Unlike the other birds, these cannot fly and desperately they make for the only sanctuary they know – the safety of the water. But the men are too fast! In a flash one of them reaches the nearest bird and bludgeons it to the ground where it flaps hopelessly until it is picked up and strangled. The other bird waddles on, panic and distress driving it forward, its little, useless wings helplessly outstretched. Almost, it has reached the water. Almost, but not quite! One of the Icelanders darts in front and cuts it off from the sea. Another comes up behind. As the bird turns just a yard or two from safety, the first man seizes it firmly and breaks its neck. The men roughly pick up the poor broken bodies and return across the strand to their boat." The tradition has it that these two birds were the very last of their kind, the last Great Auks.

It is splendid, "fascinating" book about "fascinating" bird. The book contains all currently available information and so "the tale of the Great Auk doesn't end with its extinction." Given are the appearance (morphology) of the Great Auk, the Great Auk's place in the world of birds, its biology, detailed description of the tragedy of this bird and its last days in 1844, and "the cult" of the Garefowl (synonym of the Great Auk). The major part of the book concerns to residues that are kept in various museums throughout the world. The book contains detailed list and description of the remaining 80 stuffed birds and where they are located, a similar list of eggs, skeletons, mummies and bones is also given. There is compendium of all naturalists, zoologists, collectors etc. working on the Great Auk, along with the depiction of the bird in art and history. The publication is illustrated with good quality color photographs, reproductions of engravings, small graphics and paintings, prints of museum exhibitions, portraits of zoologists and many other pictures. All are printed on coated paper, allowing a high level of reproduction. It is very agreeable that books of this almost luxurious quality are now being published. They can hardly start to pay off their editors. The book is therefore highly recommended, not only for all friends of birds and ornithologists, especially those studying extinct birds, but for bibliophilic and most capacious "gourmets" of this type of publications as well.

And a note to the end. The author of the book is a painter whose interest in the curiosities of natural history has resulted in two previous books "Extinct Birds" and "The Lost Birds of Paradise".

Josef Chláupský

Synapsis naxiorum sp. n. from Yunnan (Coleoptera: Scarabaeidae)

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Abstract. *Synapsis naxiorum* sp. n., discovered in the Jinsha [= Yangtze] river valley (northern Yunnan, China), is described and illustrated. The new species appears belong to the *S. birmanicus* Gillet, 1907 species aggregate and it can be separated from other five so far known species of this aggregate mainly by the moderately convex, finely punctate and not microsculptured elytral intervals: while in the remaining species the elytral intervals are almost flat, unpunctate and distinctly microsculptured. A list of the *S. birmanicus* species aggregate with known distribution is provided.

Taxonomy, new species, *Synapsis birmanicus* species aggregate, check-list, distribution, Scarabaeoidea, Scarabaeinae, Coprina, China, Palaearctic region, Oriental region

INTRODUCTION

The coprine genus *Synapsis* Bates, 1868 is distributed throughout the Oriental region. Several species inhabit transient zone between the Palaearctic and Oriental zoogeographical regions from the Nepal Himalaya to Sichuan and Gansu. Only one species, *Synapsis tmolus* (Fischer von Waldheim, 1821), occurs in the Palaearctic region exclusively, widely distributed in the steppe and semidesert habitats of Middle Asia, Kazakhstan, Iran and Afghanistan (Balthasar 1963, Nikolajev 1987). Balthasar (1963) mentioned in his monograph 11 species of this genus. Since that time other six species have been described (Krikken 1987, Ochi 1992, Masumoto 1996, Hanboonsong & Masumoto 1999).

In the process of gathering data on the Scarabaeoidea species diversity of transient zone between the Palaearctic and Oriental zoogeographical regions, an unknown *Synapsis* species was collected in northern Yunnan. By comparison with material kept in the collections of the Museum für Naturkunde der Humboldt Universität (Berlin), the Muséum national d'Histoire naturelle (Paris), the Natural History Museum (London) and the Staatliches Museum für Tierkunde (Dresden) and by subsequent study of the literature was confirmed that the collected material represents a new species described in the present paper.

MATERIAL AND METHODS

Specimens of the newly described species are provided with one red printed label: *Synapsis naxiorum* sp. n. HOLOTYPE, ALLOTYPE or PARATYPE with No., and sex symbol for male or female, David Kral & Jiří Rejsek det. 1996. Exact label data are cited for the material. Additional comments of the authors are found in square brackets.

TAXONOMIC PART

Synopsis naxiorum sp. n.

(Fig. 1)

Synopsis naxiorum Kabakov & Napolev, 1999: 65, nomen nudum

TYPE MATERIAL. Holotype (male), allotype (female) and paratypes Nos 1–12 (males), Nos 13–19 (females), labelled YUNNAN ca 2000m 27°15'N 100°09'E HUTIAO gorge JINSHA r [= river] 18–22/7 [19]92 David Král leg. [printed], paratype No 20 (female), labelled China N-YUNNAN 27°18'N 100°13'E Jinsha r [= river] vall [= valley] 1990m DAJU, HUTIAO gorge lgt D Král 16–17/7 [19]90 [printed] Holotype, allotype and paratypes Nos 1–10 and 16–20 in David Král collection, Praha, paratypes Nos 11–14 in Jiří Rejšek collection, Poděbrady, paratype No 15 in collection of the Moravian Museum (Brno)

DESCRIPTION. Body length 18–29 mm (holotype – 25 mm, allotype – 29 mm). Oval, dorsoventrally depressed; whole surface black and shiny, setation reddish brown; dorsal aspect of habitus as in Fig. 1.

Male. Head. Clypeus with apex sharply, triangularly emarginate, lobe either side of emargination straight, then broadly sinuate and slightly notched between clypeus and gena. Frons feebly but distinctly elevated, tubercle absent. Clypeogenal suture distinct. Gena acutely angular laterally, not projecting posterolaterad. Clypeus and genae distinctly bordered, border of clypeus with row of long, dense setae. Surface of clypeus coarsely and densely punctate, punctures irregularly transversally oblong; frons and gena distinctly, densely and evenly granulate, granules separated by less than their diameters.

Pronotum moderately convex, transversal, broadest at level of anterior quarter of pronotal length, entirely bordered; anterior margin broadly bisinuate, straight and slightly crenate laterally; anterior angles, obtusely angular with sharp apex; sides almost straight (e. g., holotype) or slightly sinuate (e. g., allotype) and divergent in approximately anterior quarter, then broadly arcuate to broadly arcuate posterior angles; lateral supplementary carina and basal margin broadly arcuate. Surface finely, densely and almost evenly punctate discally, punctures separated by approximately 2–3 their diameter; finely granulate laterally and along basal margin.

Scutellum absent.

Elytra moderately convex, broadly arcuate laterally, ten striate; seven striae between suture and humerus distinctly impressed, finely, sparsely and almost evenly punctate, stria punctures making stria margins slightly crenate; intervals moderately convex, all of approximately same width discally, except for sutural interval distinctly angustate, interval 2 not swollen basally, surface not microsculptured, finely irregularly punctate.

Pygidium entirely bordered, finely transversally scabrous.

Proepisternum with setose cavity near anterior angle; mesosternum finely microsculptured, impunctate, mesepisternum without setose cavity, sparsely granulate; metasternum distinctly concave posteriorly, with longitudinal furrow in posterior half, surface sparsely punctate discally, granulate laterally, metepisternum granulate.

Mesocoxae widely separated and parallel; meso- and metatrochanter with several fine punctures and tuft of several setae posteriorly; femora sparsely, irregularly punctate; profemur with complete anterior transversal edge; metafemur with slightly serrate and setose medial transversal edge, posterior edge with distinct, sharp denticle situated in basal third of metafemur length; protibia tridentate, meso- and metatibia slender basally, gradually slightly dilated apicad, metatibia not markedly thickened and not curved.

Abdominal sternites slightly narrowed medially, finely microsculptured and finely, sparsely, irregularly punctate.

Parameres as in other so far known *Synapsis birmanicus* species aggregate members (cf. Hanboonsong & Masumoto 1999: figs 14, 15).

Female without striking characters, abdominal sternites medially not narrowed.

DIFFERENTIAL DIAGNOSIS. The new species belongs to the *Synapsis birmanicus* species aggregate sensu Hanboonsong & Masumoto (1999) due to presence of the following set of diagnostic characters: anterior angles of proepisternum with setose cavity; lateral angles of gena not projecting posteriad, anterior angles of pronotum not reflexed. *Synapsis naxiorum* sp. n. differs from other five species assigned presently to this aggregate (for details see the list below) by the moderately convex, finely punctate and not microsculptured elytral intervals, while in the rest of species the pronotal intervals are almost flat, impunctate and distinctly microsculptured.

COLLECTION CIRCUMSTANCES. Specimens collected in 1992 were taken from under cow and horse dung or from shallow subterranean burrows of depth of maximally 10 cm; one specimen (male) was attracted by light in the evening. Paratype No. 20 was taken from human faeces. The locality Hutiaoxia [= Tiger gorge] situated between the Yulongshan and the Habashan mountain ranges, represents an open, deep valley of the Yangtze river grown with xerothermic steppe-like vegetation.

DISTRIBUTION. China (Yunnan).

NAME DERIVATION. Patronymic; dedicated to the Naxi hill tribe people inhabiting northern Yunnan where the new species has been discovered.



Fig. 1. Habitus of *Synapsis naxiorum* sp. n. - dorsal view of holotype.

List of the *Synopsis birmanicus* species aggregate with known distribution

<i>S. birmanicus</i> Gillet, 1907: 600	Myanmar (3, 1*, 2*, 4*, 6*, 7*), N Thailand (5, 6), Yunnan (7), Malay peninsula, Sumatra (9)
<i>S. dickinsoni</i> Hanboonsong et Masumoto, 1999: 457	N Thailand (7)
<i>S. masumotoi</i> Ochi, 1992: 10	Taiwan (10–12)
<i>S. naxosorum</i> sp. n.	Yunnan (8–14)
<i>S. ochi</i> Masumoto, 1996: 87	N Thailand (11–8*)
<i>S. sama</i> Gillet, 1911: 313	Laos (5, 1*, 2*, 3*, 7*, 8*, 13*), N+E Vietnam (5–1*, 2*, 3*, 7*, 12*, 8)

Compiled from the following sources: 1 – Arrow (1931), 2 – Balthasar (1963), 3 – Boucomont & Gillet (1921), 4 – Gillet (1907), 5 – Gillet (1911), 6 – Hanboonsong et al. (1999), 7 – Hanboonsong & Masumoto (1999), 8 – Kabakov & Napolov (1999), 9 – Krikken (1987), 10 – Masumoto (1973), 11 – Masumoto (1996), 12 – Ochi (1992), 13 – Paulian (1945), 14 – this paper, * – repeated localities from the preceding source

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Review of capillariid and trichosomoidid nematodes from mammals in the Czech Republic and the Slovak Republic

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Abstract. Species of capillariid and trichosomoidid nematodes recorded so far in mammals in the Czech Republic and the Slovak Republic are reviewed. Altogether 23 species belonging to the capillariid genera *Anchotheca* Lopez-Neyra, 1947 (10 species), *Calodium* Dujardin, 1845 (2), *Eucoleus* Dujardin, 1845 (6), *Linisius* Dujardin, 1845 (2), *Pearsonema* Freitas et Mendonça, 1960 (2) and the trichosomoidid genus *Trichosomoides* Railliet, 1895 (1) and also *Nematodeum talpae* Siebold, 1850 considered a species *inquirenda* have been recorded. Since the morphology of many species is little known, the following species are redescribed and illustrated on the basis of museum specimens or a newly collected material: *Anchotheca annulosa* (Dujardin, 1845), *A. bovis* (Schnyder 1906), *A. erinacei* (Rudolphi, 1819), *A. speciosa* (Beneden 1873), *Eucoleus aerophilus* (Creplin 1893), *E. bacillatus* (Eberth, 1863), *E. boehmi* (Supperer, 1953), *E. gastricus* (Baylis, 1926), *E. oesophagicola* (Soltys, 1952), *E. tenuis* Dujardin, 1845, *Pearsonema pilica* (Rudolphi, 1819), and *Trichosomoides crassicauda* (Bellingham, 1840). *Capillaria kuoni* is transferred to *Anchotheca* as *A. kuoni* (Rukhlyadeva, 1946) comb. n. Data on the occurrence and hosts of all species in the Czech Republic and the Slovak Republic and taxonomic remarks to individual species are provided. Necessity of further detailed studies on these important parasites is stressed.

Taxonomy, distribution, parasitic nematodes, Capillariidae, Trichosomoididae, mammals, Palaearctic Region

INTRODUCTION

Members of the trichinelloid families Capillariidae and Trichosomoididae are frequent parasites of various body organs of hosts belonging to all main classes of vertebrates including man, some of them being known to be the agents of serious diseases. Although the Trichosomoididae represents a small group containing a few highly specialized species of tissue parasites, the Capillariidae includes about 300 species, many of them poorly described (Moravec 1982). This complicates considerably the species identification of capillariids that are often determined erroneously or with uncertainty. Moreover, the taxonomy of this group of parasites is further complicated by substantial differences in the opinions of authors as to the taxonomic value of various morphological features. Although recent authors mostly follow the classification system and the delimitation of genera proposed by Moravec (1982), there are still others who share the opinion of Baylis (1931) that the entire group of capillariids is represented by a single genus *Capillaria* Zeder, 1800 *sensu lato*.

Taxonomic revisions based on extensive studies of specimens were accomplished in capillariids parasitizing poikilotherm hosts (fishes, amphibians, reptiles) by Moravec (1986a, b, c, 1987a, b, 2000) and those from palaearctic birds by Baruš & Sergejeva (1989a, b, 1990a, b) and Okulewicz (1993). However, mammalian capillariids have not yet been revised in this way and they, as a whole, remain poorly known. Despite the fact that a detailed revision of all mammalian capillariids is urgently needed, it will take several years until this group, rich in species, can be revised.

Although capillarids have frequently been recorded from mammals in former Czechoslovakia (present Czech Republic and Slovak Republic), the morphology of these species is mostly inadequately known and they were usually reported under the names which are no longer valid according to the presently used classification system. During recent years, the present author has attempted to re-study the available specimens of mammalian capillarids reported from the Czech Republic (CR) and the Slovak Republic (SR). Unfortunately, original materials of the majority of species from this territory are not existing and, therefore, some newly collected specimens or those borrowed from museums from neighbouring countries were used in this study, reviewing the species reported from this territory. It is necessary to stress the necessity of further detailed studies on this important, but poorly known group of parasites.

MATERIALS AND METHODS

The following materials were studied:

Anchotheca annulosa: 10 specimens (5 males + 5 females) from the small intestine of *Apodemus* sp. collected in Klatov, southern Bohemia (CR), in 1985. "*Capillaria* sp." (4 males + 9 females from the small intestine of *Clethrionomys glareolus*, *Apodemus flavicollis* and *Microtus oeconomus*, Mus. Naturk. Berlin (cat. nos. 6694, 6696, 6697). *A. boya*: "*Capillaria brevipes*" (1 male + 6 females) from the small intestine of *Ovis aries* from Bethesda, Maryland, USA. Mus. Naturk. Berlin (cat. no. 4797). *A. erinacei*: Numerous specimens collected from *Erinaceus europaeus* in České Budějovice, southern Bohemia (CR) in May 1989 and September 1997. "*Trichosoma exiguum*" (specimens in poor condition) from *E. europaeus*, Mus. Naturk. Berlin (cat. nos. Q 3862, 4146). *A. putorii*: "*Capillaria entomelas*" (1 damaged male) and "*C. putorii*" (body fragments), both from *Mustela putorius*, Naturhist. Mus. Wien (cat. nos. 6258, 6283). *A. speciosa*: "*Capillaria vespertilionis*" from *Nyctalus noctula* (1 male + 5 females), Naturhist. Mus. Wien (cat. no. 6284).

Eucoleus aerophilus: "*Capillaria aerophila*" (numerous specimens - cotypes) from the trachea of *Vulpes vulpes*, and "*C. aerophila*" from *V. vulpes*, Naturhist. Mus. Wien (cat. nos. 6263, 6309). *E. bacillatus*: 1 specimen (male) from the stomach of *A. flavicollis* from Lhenec, southern Bohemia (CR), collected in June 1997. *E. boehmi*: "*Capillaria* sp." (numerous specimens) from nostrils of *V. vulpes* from Clausthal, Germany, Mus. Naturk. Berlin (cat. no. 5715). *E. gastricus*: 10 specimens (males + females) from the oesophageal mucosa of *Rattus norvegicus* from České Budějovice, southern Bohemia (CR), collected in November 1990. *E. oesophagicola*: Specimens (1 male + 5 females) from the oesophagus of *Neomys anomalus* from Borovany, southern Bohemia (CR), collected in August 1986. *E. tenuis*: "*Eucoleus tenuis*" male and female body fragments from *E. europaeus*, Naturhist. Mus. Wien (cat. no. 6308). "*Trichosoma tenuis*" (2 females in poor condition) from lungs of *E. europaeus*, Mus. Naturk. Berlin (cat. no. Q 3841).

Linxus incassatus: Types of "*Trichosoma capillare*" (4 body fragments in poor condition) from the urinary bladder of *Talpa europaea*, Mus. Naturk. Berlin (cat. no. Q 3856).

Pearsonema mucronata: Small body fragments of "*Trichosomum mucronatum*" and "*Capillaria mucronata*" from the urinary bladder of *Meriones foina*, Mus. Naturk. Berlin (cat. nos. Q 3867, 4150). *P. plicata*: "*Capillaria plicata*" syntypes (male and female body fragments) from *Canis lupus*, Zool. Mus. Berlin (cat. no. 53). Numerous specimens from the urinary bladder of *Vulpes argentata* and *V. vulpes*, Mus. Naturk. Berlin (cat. nos. 998, 6885, 6933).

Trichosomoides crassicauda: 4 females containing males from the urinary bladder of *R. norvegicus* from České Budějovice, southern Bohemia (CR), collected in November 1990.

Newly collected specimens have been deposited in the helminthological collection of the Institute of Parasitology, ASCR, in České Budějovice. All drawings were made with the aid of a camera lucida. Measurements are given in millimetres.

RESULTS

Superfamily Trichinelloidea Ward, 1907 (1879)

Family Capillariidae Railliet, 1915

Genus *Aonchotheca* López-Neyra, 1947

Aonchotheca annulosa (Dujardin, 1845) López-Neyra, 1947

(Figs 1, 2)

Calodium annulosum Dujardin, 1845

Capillaria intestinalis Vanni, 1937

Thomox sadovskoi (= *sadovskajae*) Morozov in Skryabin, Shikhobalova et Orlov, 1957

Thomox platyrhynorum Batuš, 1961

DESCRIPTION (based on specimens from *Apodemus* sp. reported by Moravec & Baruš 1991). Medium sized nematodes with smooth cuticle. Lateral bacillary bands present, well visible. Head end narrow, rounded, oral papillae indistinct. Muscular oesophagus comparatively long and narrow. Stichosome consisting of single row of 34–47 medium sized, lightly coloured stichocytes; stichocytes subdivided into about 7–10 transverse annuli; nuclei of stichocytes considerably large, their nucleoli usually containing several corpuscles. Pair of small wing-like cells present at junction of oesophagus and intestine.

Male. Length of body 21.69–23.46, maximum width 0.054. Width of lateral bacillary bands 0.024–0.030. Length of entire oesophagus 6.73–8.34 (31–36% of body length), of muscular oesophagus and stichosome 0.585–0.612 and 6.15–7.73, respectively; stichocytes 37–47 in number. Distance of nerve ring from anterior extremity 0.111–0.117. Spicule long, slender, well sclerotized, with smooth surface; its proximal end slightly expanded, distal end narrow, rounded, length of spicule 1.11–1.27 (forming 4.8–5.4% of body length), its maximum width 0.006. Spicular sheath nonspinous, narrow, very long; its proximal part (approximately one fifth of its length) appearing to be densely covered by minute, slightly sclerotized refractile formations (protuberances) of irregular shape, remaining part of sheath with dense transverse striations, serrated at both sides; length of evaginated sheath 1.10–1.92, its width 0.009–0.018. Posterior end of body rounded, provided with well developed membranous bursa; bursa supported by two large subventral caudal lobes, each of them bearing one pedunculate, anteriorly directed papilla; bursa 0.018–0.021 long and 0.042 wide in ventral view. Cloacal opening subterminal. Caudal alae subventral, well developed, very long, distinctly separated from caudal bursa; length of alae 2.72–4.55, their maximum width 0.012–0.015.

Female. Length of body of gravid specimens 19.75–29.54, maximum width 0.082. Width of lateral bacillary bands 0.030–0.039. Length of entire oesophagus 7.25–8.30 (27–37% of body length), of muscular oesophagus and stichosome 0.449–0.625 and 7.25–8.30, respectively; stichocytes 34–46 in number. Nerve ring 0.084–0.129 from anterior extremity. Vulva 0.066–0.099 posterior to end of oesophagus; anterior lip of vulva sometimes slightly elevated, vulvar appendage absent. Eggs near vulva in single row, more distant eggs in two rows. Mature eggs oval, with distinctly protruding polar plugs; egg shell two-layered, outer layer with dense, fine longitudinal and oblique wrinkles on surface; content of eggs in uterus uncleaved. Length of eggs including polar plugs 0.060–0.066, width 0.027–0.030, thickness of their wall 0.002–0.003. Height of whole polar plug 0.006–0.009, of its protruding part 0.003; width of plug 0.006–0.007. Anus subterminal, length of tail 0.012–0.018; tail bluntly rounded. Posterior end of ovary approximately at mid-length of rectum; rectum 0.090–0.105 long.

Hosts. Mostly various murid rodents (*Apodemus*, *Clethrionomys*, *Rattus*) and *Cricetus cricetus*. Reported even from the hedgehog *Atelerix algirus* and the zoo-kept monkey *Cebus capucinus*.

SITE. Small intestine.

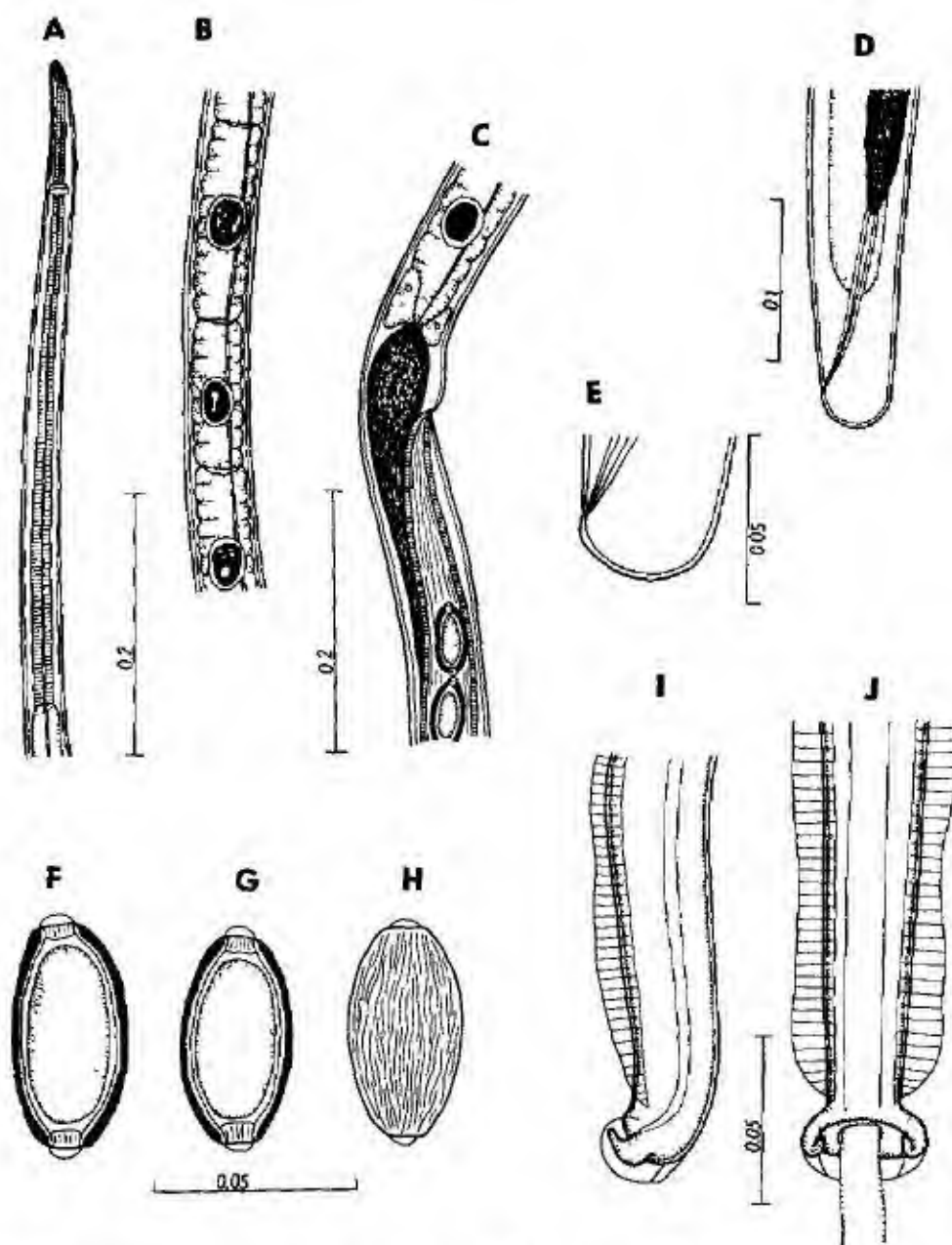


Fig. 1 *Aonchotheca annulosa* (Dujardin) from *Apodemus* sp. A – anterior end, B – stichocytes, C – region of vulva, D – posterior end of female, E – tail of female, F–H – eggs, I, J – posterior end of male, lateral and ventral views (After Moravec & Baruš 1991) Scales in mm

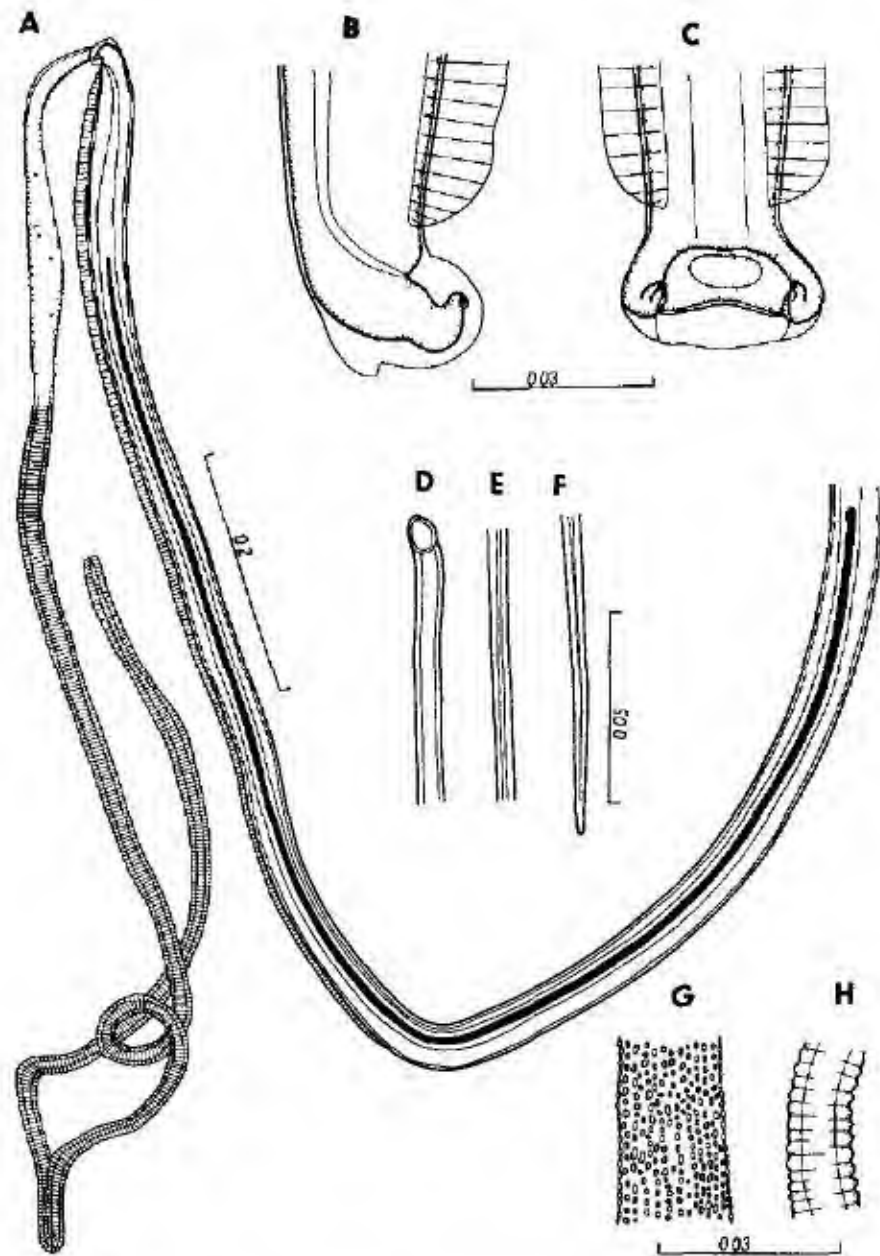


Fig. 2. *Aonchotheca stimulosa* (Dujardin) from *Apodemus* sp. A – posterior end of male with evaginated spicular sheath, B, C – tail of male, lateral and ventral views, D, E, F – proximal, middle and distal parts of spicule, G, H – anterior and posterior regions of evaginated spicular sheath. (After Moravec & Baruš 1991). Scales in mm.

RECORDS IN CR AND SR. This species was first reported as *Capillaria intestinalis* from *Rattus norvegicus* from Prague (CR) by Drbohlav & Gabriel (1938–1939) and Jirovec & Stecker (1941–1944). The latter authors gave its prevalence in rats to be 4%, whereas Mokošiak (1960), reporting it later in his unpublished thesis under the synonym *C. intestinalis* from the same host species in Brno (CR), gave the prevalence 5.7%. Later this species was reported as *Capillaria annulosa* by Chalupsky (1953) from 12% of *R. norvegicus* and *R. rattus* from Prague and surroundings (CR), Erhardova (1964) from *Apodemus flavicollis* and *A. sylvaticus* from the surroundings of Prague and Orlik (CR), Tenora & Zavadil (1967) and Tenora & Zeyda (1974) from *Clethrionomys glareolus* in southern Moravia (CR) (intensity up to 100 nematodes), and Dyk et al. (1975) (as *Capillaria* sp.) from *R. norvegicus* (15%) in Brno (CR). In Slovakia, Mituch (1960) reported it from the intestine and the stomach of *R. norvegicus* from four localities (Nove Mesto nad Vahom, Kralovsky Chlmec, Rajec, Sečovce – SR) (total prevalence 1.1%, intensity 1–8) and Meszaros & Štollmann (1984) and Murai & Meszaros (1984) from *A. flavicollis* (intensity 4–60) and *C. glareolus* from the Western Carpathians Mountains (SR). Baruš & Moravec (1991) recorded it from *Apodemus* sp. from Klec, southern Bohemia (CR).

Aonchotheca annulosa was also recorded from the small intestine of the monkey, *Cebus capucinus*, kept in captivity in a zoo in Prague (CR) (Baruš 1961, Moravec & Baruš 1991).

TAXONOMIC REMARKS. A characteristic feature of this species is the presence of very long caudal alae, structure of the spicular sheath and length of the spicule.

***Aonchotheca bovis* (Schnyder, 1906) Moravec, 1982**
(Fig. 3)

Trichostrongylus bovis Schnyder 1906

Capillaria brevipes Ransom 1911

Capillaria longipes Ransom, 1911

DESCRIPTION (based on specimens from *Ovis aries*, USA). Medium sized nematodes with smooth cuticle. Lateral bacillary bands present, difficult to observe. Cephalic end narrowed, rounded, oral papillae indistinct. Muscular oesophagus comparatively long and narrow. Stichosome consisting of single row of 36–42 medium sized, lightly coloured stichocytes, stichocytes mostly subdivided into about 10–15 transverse annuli, nuclei of stichocytes large. Pair of small wing-like glandular cells present at oesophago-intestinal junction.

Male. Length of body 8.46, maximum width 0.054. Length of entire oesophagus 4.27 (50% of body length), of muscular oesophagus and stichosome 0.504 and 3.77, respectively, stichocytes 36 in number. Nerve ring 0.093 from anterior extremity. Seminal vesicle 0.735 long. Spicule long, weakly sclerotized, with smooth surface, its proximal end slightly expanded, distal end conspicuously narrowed, pointed in lateral view. Length of spicule 0.822 (9.7% of body length), its maximum width 0.004. Spicular sheath nonspinous, narrow, evaginated sheath 0.180 long and 0.012 wide. Posterior end of body rounded in lateral view, with well developed membranous bursa 0.018 long, supported by two elongate caudal lobes with narrow distal ends and small dorsal extensions at some distance posterior to ends, visible in lateral view, base of each caudal lobe appearing to bear on its inner side a small sessile papilla like formation. Cloacal opening subterminal. Subventral caudal alae well developed, distinctly separated from bursa, 0.156 long and 0.024 wide.

Female. Length of body of gravid specimens 10.34–12.32, maximum width 0.054–0.068. Lateral bacillary bands 0.027–0.030 wide. Length of entire oesophagus 4.76–5.14 (36–44% of body length), of muscular oesophagus and stichosome 0.501–0.636 and 3.96–4.58, respectively, stichocytes 38–42 in number. Nerve ring 0.084–0.111 from anterior extremity. Vulva 0.060–0.135 posterior to end of

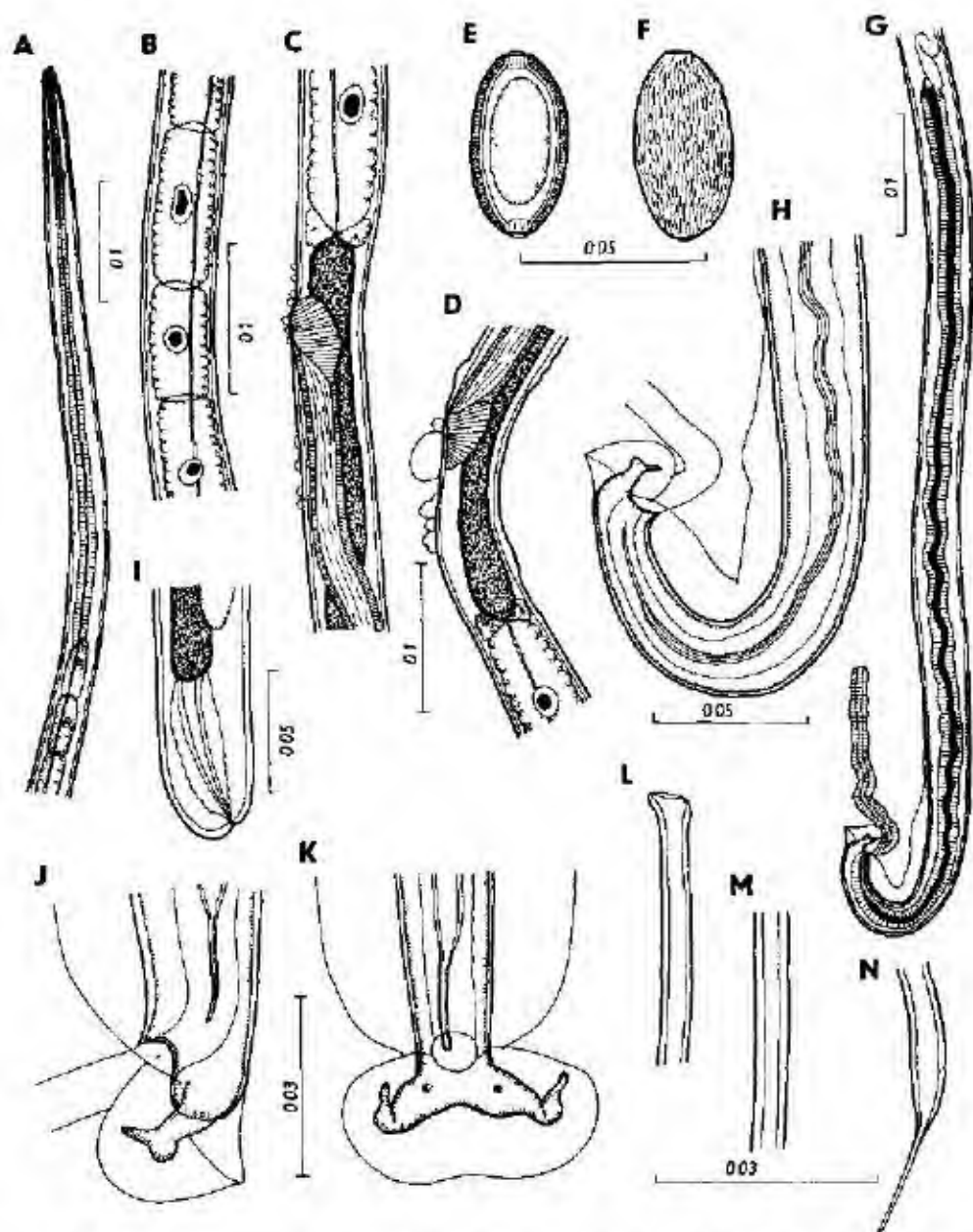


Fig. 3 *Anchoithea hovy* (Schneider) from *Ours aris*. A - anterior end of gravid female, B - stoeboeyes in middle part of stichosome, C - region of vulva, D - same, another specimen, E - egg, F - same, with marked superficial sculpture, G - posterior end of male with evaginated spicular sheath, H - caudal end of male, I - posterior end of female, J, K - caudal end of male, lateral and ventral views, L, M, N - proximal, middle and distal parts of spicule. Scales in mm.

oesophagus, vulvar lips not elevated. Ventral region anterior and posterior to vulva bearing several irregular lobes of inflated cuticle, usually one being distinctly larger (height 0.009–0.024) than others, a few small cuticular inflations may be present on dorsal side near level of vulva. Distal end of vagina forming conspicuously large dorsal muscular formation. Eggs near vulva in single file. Mature eggs oval, thick-shelled, polar plugs slightly protruding or not protruding; egg shell two-layered, inner thin layer hyaline, outer thick layer with short longitudinal and oblique grooves on surface; content of eggs uncleaved. Length of eggs including polar plugs 0.045–0.060, maximum width 0.024–0.027, thickness of their wall 0.003. Height of whole polar plug 0.006, its width 0.006. Caudal end rounded. Anus subterminal, length of tail 0.006–0.009. Rectum 0.063–0.090 long.

HOSTS. Various species of ruminants of families Antilocapridae (*Antilocapra*), Bovidae (*Ammotragus*, *Bison*, *Bos*, *Bubalus*, *Capra*, *Capricornis*, *Dama*, *Nemorhaedus*, *Ovibos*, *Ovis*, *Rupicapra*), Cervidae (*Alces*, *Capreolus*, *Cervus*, *Elaphurus*, *Hydropotes*, *Odocoileus*, *Rangifer*), Camelidae (*Camelus*) and Giraffidae (*Okapia*).

SITE. Small intestine, abomasum, jejunum, ileum.

RECORDS IN CR AND SR. The first records of this species (reported as *Capillaria longipes*) are those by Erhardová & Ryšavý (1952), Ryšavý & Erhardová (1952, 1953) and Ryšavý (1953), who found the eggs of this nematode during their coprological examinations of sheep (*O. aries*) (prevalence about 1%) in the Orlické Hory Mountains (Jedlová) (CR); the authors mention that it occurs more frequently in hoofed game animals (in about 2.5%). From native and introduced hoofed games, this capillariid (as *C. bovis*) has been reported by Erhardová & Kotrlý (1955) and Kotrlá & Kotrlý (1975, 1977) from *Capreolus capreolus*, *Cervus elaphus*, *C. nippon*, *Dama dama* and *Ovis ammon* from several localities in the Czech Republic (Jindřichův Hradec, Mariánské Lázně, Beroun, Jeseníky Mountains, southern Moravia).

TAXONOMIC REMARKS. The specimens used for the above description were collected and identified by B. H. Ransom as his species *C. brevis*, now generally considered a synonym of *A. bovis*. This species differs from *A. erinacei* mainly by the structure of the male caudal end and a somewhat longer spicule.

Aonchotheca erinacei (Rudolphi, 1819) López-Neyra, 1947

(Fig. 4)

Trichosoma erinacei Rudolphi, 1819

Capillaria erinacei-europaei Diesing, 1851

Trichosomum eugenum Dujardin, 1845

DESCRIPTION (based on newly collected specimens from *E. europaeus* from CR). Medium sized nematodes. Lateral bacillary bands extending along body. Stichocytes in single file, elongate, mostly subdivided into several transverse annuli, with large cell nuclei. Pair of wing-like glandular cells present at oesophago-intestinal junction.

Male. Length of body 6.49–7.25, maximum width 0.041–0.054. Lateral bacillary bands 0.018–0.030 wide. Entire oesophagus 2.65–3.37 long, representing 38–52% of body length. Muscular oesophagus 0.225–0.303 long, stichosome measuring 2.43–3.07. Nerve ring 0.081–0.111 from anterior extremity. Spicule long, slender, weakly sclerotized, with smooth surface; its proximal end slightly expanded, distal end conspicuously narrowed and pointed in lateral view and blunt in ventral view. Length of spicule 0.375–0.423 (5.4–6.5% of body length), width 0.006. Spicular sheath non-spinous, narrow, very long; evaginated sheath 0.645–0.849 long and 0.012–0.015 wide, its proximal part appearing to bear numerous minute, slightly sclerotized refractile formations on surface, remaining part of sheath with dense transverse striations. Posterior end of body rounded, with well developed membranous bursa 0.015–0.024 long, supported by two elongate caudal lobes measur-

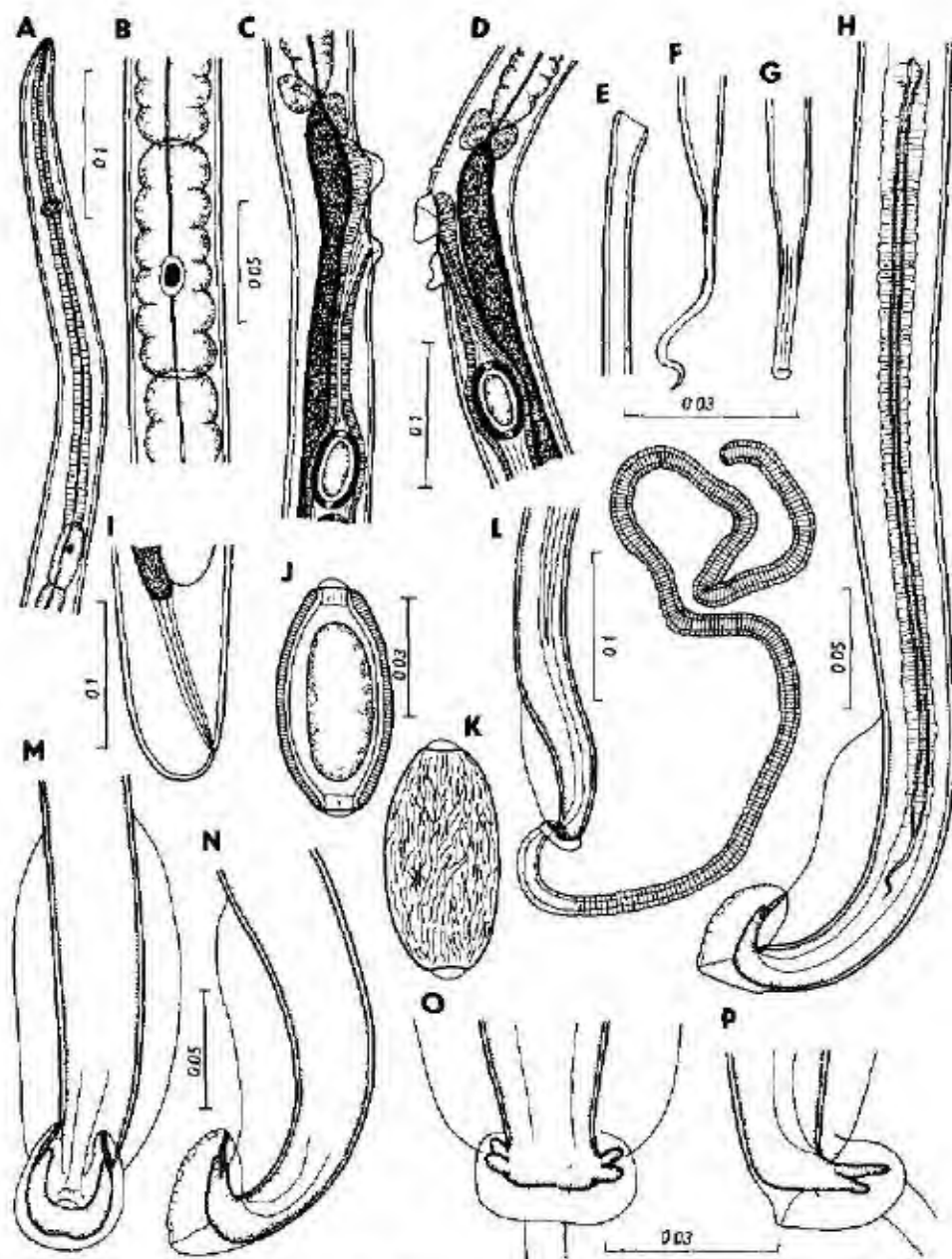


Fig. 4. *Monchotheca erinacei* (Rudolphi) from *Erinaceus europaeus*. A - anterior end of female. B - stichocyte in middle part of stichosome. C - region of vulva. D - same, another specimen. E - proximal end of spicule. F, G - distal end of spicule, lateral and ventral views. H - posterior end of male. I - posterior end of female. J - egg. K - egg with marked superficial sculpture. L - posterior end of male with evaginated spicular sheath. M, N - anterior end of male, ventral and lateral views. O, P - caudal end of male, dorsal and lateral views. Scales in mm.

ing 0.015–0.030, each of them subdivided into two branches in their distal parts. Cloacal opening subterminal. Subventral caudal alae well developed, distinctly separated from bursa, 0.114–0.135 long and 0.024–0.045 wide.

Female. Length of body of gravid specimens 11.49–15.23, maximum width 0.068–0.082. Lateral bacillary bands 0.024–0.027 wide. Length of entire oesophagus 4.43–4.49 (29–39% of body length), of muscular oesophagus and stichosome 0.336–0.465 and 4.02–4.10, respectively. Nerve ring 0.090–0.105 from anterior end. Vulva 0.060–0.069 posterior to end of oesophagus, its anterior and posterior lips provided with markedly elevated lobes of inflated cuticle 0.012–0.015 high, few small cuticular bosses may be present in front of vulva. Eggs near vulva arranged in single file. Mature eggs oval, with distinctly protruding polar plugs, egg shell two-layered, outer layer with dense, fine longitudinal and oblique wrinkles on surface, content of eggs uncleaved. Length of eggs including polar plugs 0.063–0.075, width 0.030–0.033, polar plugs 0.006 long and 0.006 wide. Anus subterminal, length of rounded tail 0.012.

Hosts. Hedgehogs (*Erinaceus*)

Site. Stomach, intestine, oesophagus.

RECORDS IN CR AND SR. This species was recorded by Prokopič (1957d, 1959) under the name *Capillaria erinacei* as a frequent parasite of *E. concolor* (reported as *E. e. roumanicus*) and *E. europaeus* from different localities in CR (Prague, Český Brod, Uherský Brod) and SR (Nové Zámky, Kokava), a total prevalence (species of hedgehogs not distinguished) was 29%, with the intensity 4–60 nematodes. Later it was found in the stomach and small intestine of all 3 *E. europaeus* collected in České Budějovice (CR) in May 1989 and September 1997, where the intensity ranged from 54 to about 600 nematodes (Moravec, unpublished).

Eggs probably belonging to this species (reported as *Capillaria* sp. type II and III) were found by Šlapeta (1999) in coprologically examined *E. europaeus* and *E. concolor* originating from central Bohemia and Brno (CR), the author mentioned that they might belong to *A. erinacei* and *Capillaria ovorencularis* Laubmeier, 1985 (the latter species is invalid, because its description has not been published – see Laubmeier 1985).

TAXONOMIC REMARKS. According to Butterworth & Beverley-Burton (1980), *A. erinacei* is a synonym of *A. putorii* (Rudolphi, 1819), a parasite of carnivores. However, this synonymy is not generally recognized (e.g., Mas-Coma & Galán-Puchades 1985, Boag & Fowler 1988) and, consequently, it is dealt with as a separate species.

Aonchotheca kutori (Rukhlyadeva, 1946) comb. n.

Capillaria kutori Rukhlyadeva, 1946

Capillaria ventricola Solitys, 1952

HOSTS. Insectivores (*Neomys*, *Sorex*)

Site. Stomach, small intestine, oesophagus.

RECORDS IN CR AND SR. This species was first recorded by Prokopič (1956) from *Sorex araneus* (prevalence 9%, intensity 1–4) in southern Slovakia (SR). Subsequently he (Prokopič 1957a, c, 1958, 1959) found it in *Neomys fodiens*, *Sorex alpinus*, *S. araneus* and *S. minutus* from many localities in Bohemia (e.g., Šumava Mountains, Krkonoše Mountains, southern Bohemia) (CR), Moravia (e.g., Beskydy Mountains, southern Moravia) (CR) and Slovakia (High Tatras, western, southern and eastern Slovakia) (SR). Meszaros & Štollmann (1984) and Murai & Mészáros (1984) reported it from *N. fodiens* and *S. minutus* from the Western Carpathians Mountains (SR).

TAXONOMIC REMARKS. No specimens of this little-known species were available. Moravec (1982) listed it provisionally in the genus *Baruscapillaria* Moravec, 1982, but the illustrations of *C. kutori*

given by Genov (1984) show clearly the presence of caudal lateral alae in the male and, therefore, it should be transferred to *Aonchotheca*. A detailed redescription of this species is necessary, it should be thoroughly compared with *A. petrovi*, because both species may prove to be conspecific.

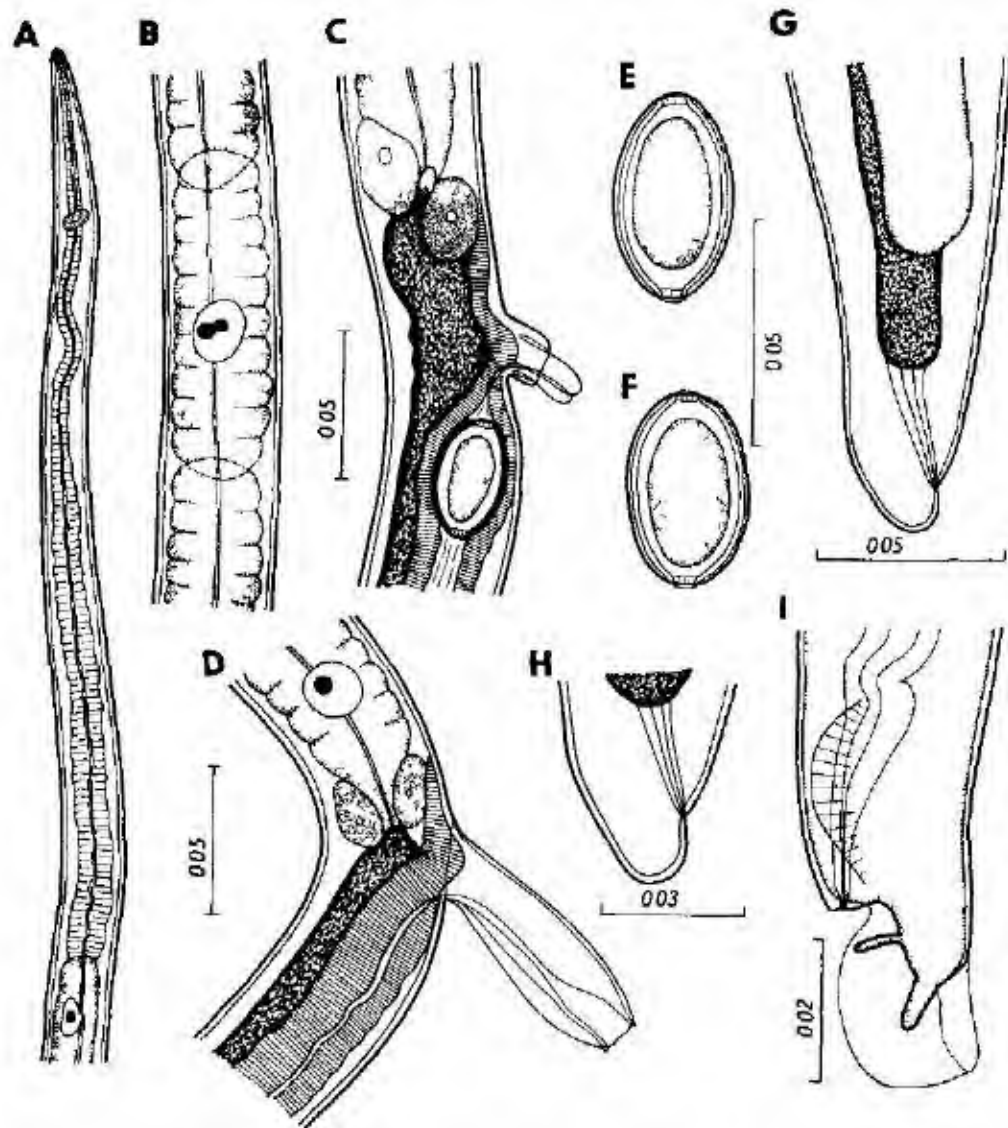


Fig. 5. *Aonchotheca speciosa* (Beneden) from *Nyctalus noctula*. A - anterior end of female, B - stichocyte in middle part of stichosome, C, D - region of vulva, different specimens, E, F - egg, G - posterior end of female, H - caudal end of female, I - caudal end of male, lateral view. Scales in mm.

***Aonchotheca murissylvatici* (Diesing, 1851) López-Neyra, 1947**

Trichostrongylus muris sylvatici Diesing, 1851

Capillaria bathi Kalantarian, 1924

Capillaria wislizeni Rukhlyadeva, 1950

HOSTS. Murid rodents (*Apodemus*, *Clethrionomys*, *Microtus*).

SITE. Small intestine, rarely stomach.

RECORDS IN CR AND SR. Erhardová & Ryšavý (1955) recorded this species (as *Capillaria murissylvatici*) from the small intestine of *Apodemus flavicollis*, *A. sylvaticus*, *Clethrionomys glareolus* and *Microtus arvalis* from Prague and Lednice (CR) and the Vihorlat Mountains and southern Slovakia (SR). However, the authors considered erroneously *Calodium annulosum* Dujardin, 1845 (= *A. annulosa*) a synonym of *A. murissylvatici* and, therefore, they confused both these species; in the same year, Tenora & Baruš (1955) reported *A. murissylvatici* from *A. flavicollis* (prevalence 2%, intensity 12–36) from Lednice and surroundings (CR). Erhardová (1958) and Mitáč (1960) reported also *Rattus norvegicus* as hosts of this species, but probably these were misidentifications. Other papers reporting *A. murissylvatici* from *Apodemus* spp. and *C. glareolus* were those by Tenora (1957, 1958, 1963), Rupeš (1961, 1964) and Tenora & Zavadič (1967), but it is not clear from them whether or not *A. murissylvatici* and *A. annulosa* were considered separate species. This taxonomic problem was pointed out by Erhardová (1964), who revised her capillarid material from murids and reported *C. (= A.) murissylvatici* from *A. flavicollis*, *C. glareolus* and *M. arvalis* from Lednice and Bítov (CR) and the Vihorlat Mountains (SR). Later this species was reported from *A. flavicollis*, *A. sylvaticus*, *C. glareolus* and *M. arvalis* from Lednice by Tenora & Zejda (1974) and Tenora & Staněk (1994, 1995).

TAXONOMIC REMARKS. No specimens of *A. murissylvatici* were available to study. Characteristic features of this species is a relatively short spicule, short and broad caudal alae and the structure of the male caudal end.

***Aonchotheca mustelorum* (Cameron et Parnell, 1933) Moravec, 1982**

Capillaria mustelorum Cameron et Parnell, 1933

HOSTS. Carnivores (*Martes*, *Mustela*, *Meles*).

SITE. Small intestine, stomach.

RECORDS IN CR AND SR. The only records of this species (as *Capillaria mustelorum*) are those by Prokopič (1958, 1965) from the stomach of *Mustela nivalis* (prevalence 1.5%, intensity 6–7) from the surroundings of Prague (CR).

TAXONOMIC REMARKS. Butterworth & Beverley-Burton (1980) and some other authors consider this species a junior synonym of *A. putorii*, but others take it for a valid species. Since no specimens were available to study and the original species description is poor, it is considered an independent species until this problem is satisfactorily solved.

***Aonchotheca myoxinitelae* (Diesing, 1851) Moravec, 1982**

Trichostrongylus myoxinitelae Diesing, 1851

HOSTS. Garden dormouse, *Eliomys quercinus* (Rodentia). Also wild boar, *Sus scrofa*, according to Justine et al. (1987).

SITE. Small intestine, duodenum.

RECORDS IN CR AND SR The only record of this species (reported as *Skryabinocapillaria nyoxinitelae*) is that by Baruš & Tenora (1956, 1957) from the small intestine of *E. quercinus* from southern Slovakia (SR)

TAXONOMIC REMARKS No specimens of this species were available to study Baruš & Tenora (1957) assigned this species to the genus *Skryabinocapillaria* Skarbilovich, 1946, since the males they found appeared to lack the spicule. However, Le-Van-Hoa (1960) and Justine et al. (1987) found a weakly sclerotized spicule in the males of their material

***Aonchotheca petrovi* (Rukhlyadeva, 1946) Moravec, 1982**

Capillaria petrovi Rukhlyadeva, 1946

HOSTS Insectivores (*Neomys*, *Sorex*)

SITE Stomach, intestine, oesophagus

RECORDS IN CR AND SR This species has only been recorded by Prokopič (1957c) from the stomach of *Neomys fodiens* from eastern Slovakia (SR) and by the same author (Prokopič 1958b, 1959) from the stomach and oesophagus of *N. fodiens* and *Sorex araneus* from the Šumava Mountains, southern and southwestern Bohemia and southwestern Moravia (CR)

TAXONOMIC REMARKS No specimens of *A. petrovi* were available. The original description is poor and no illustrations were provided. Wakelin (1968) believed it might be a synonym of *A. erinacei*. A redescription of this species is urgently needed.

***Aonchotheca putorii* (Rudolphi, 1819) López-Neyra, 1947**

Trichostrongylus putorii Rudolphi, 1819

Trichostrongylus entomelas Dujardin, 1845

Calodium alatum Molin, 1858

Capillaria mustelae Stiles et Baker, 1935

HOSTS Carnivores (*Felis*, *Lutra*, *Lutreola*, *Martes*, *Meles*, *Mephitis*, *Mustela*, *Procyon*)

SITE Stomach, small intestine

RECORDS IN CR AND SR The only records of this species are those by Prokopič (1958a, 1965) from the stomach and small intestine of *Mustela putorius* from Ruská Poruba, Volyně and surroundings of Prague (CR)

TAXONOMIC REMARKS Only one very damaged male of *A. putorii* was available, showing morphological similarities to *A. erinacei*, but not enabling a detailed comparison with the latter. According to some authors, *A. erinacei* and *A. mustelorum* are junior synonyms of *A. putorii*. However, new detailed comparative studies are necessary to confirm this.

***Aonchotheca speciosa* (Beneden, 1873) Moravec, 1982**
(Fig. 5)

Trichostrongylus speciosus Beneden, 1873

Aonchotheca moravecii Esteban, Mas-Coma, Oltra Ferrero et Botella, 1991

DESCRIPTION (based on museum specimens designated as *C. vespertilionis* from *N. noctula*) Larger sized nematodes. Lateral bacillary bands extending along body conspicuous. Anterior end narrow, rounded, cephalic papillae indistinct. Muscular oesophagus comparatively long. Stochasticosome formed by single row of light-coloured, elongate stichocytes subdivided into 7–13 transverse annuli, cell nuclei large. Two large wing-like glandular cells present at oesophago-intestinal junction.

Male. Length of body 9.03, maximum width 0.054. Lateral bacillary bands 0.021 wide. Length of entire oesophagus 3.70 (41% of body length), of muscular oesophagus and stichosome 0.450 and 3.25, respectively. Nerve ring 0.090 from anterior extremity. Spicule indistinct. Spicular sheath non-spinous. Small lateral precloacal caudal alae present. Tail distinctly narrowed, rounded, provided with large membranous bursa supported by two pairs of ventrolateral finger-shaped processes (rays); length of bursa 0.027, width 0.027 in lateral view.

Female. Length of body of gravid specimens 9.52–11.70, maximum width 0.068–0.090. Lateral bacillary bands 0.021–0.030 wide. Length of entire oesophagus 3.40–4.28 (34–42% of body length), of muscular oesophagus and stichosome 0.354–0.435 and 2.97–3.94, respectively; stichocytes 30–37 in number. Nerve ring 0.084–0.096 from anterior extremity. Vulva situated 0.030–0.072 posterior to end of oesophagus, provided with elongate vulvar appendage 0.036–0.093 long and 0.021–0.033 wide. Eggs arranged mostly in two files, only a few eggs near vulva in one file. Mature eggs oval, thin-walled, unembryonated, their polar plugs low, practically not protruding; size of eggs including polar plugs 0.045–0.048 × 0.027–0.030, egg wall 0.002 thick; polar plugs 0.003 long and 0.006 wide. Sculpture on egg surface indistinct. Tail distinctly narrowed, rounded, 0.015–0.018 long. Length of rectum 0.036–0.060.

HOSTS. Bats (*Eptesicus*, *Miniopterus*, *Myotis*, *Nyctalus*, *Rhinolophus*, *Vespertilio*).

SITE. Stomach, intestine.

RECORDS IN CR AND SR. Reported only by Ryšavý (1956) as *Capillaria* sp., who recorded it from the intestine of *Myotis myotis* from central Bohemia (Středočeský kras) and central Moravia (Moravský kras) (both CR) and from southern Slovakia (Jihoslovenský kras) (SR); altogether 3 female nematodes were collected.

TAXONOMIC REMARKS. The above mentioned specimens were not available to study. Since all known capillariids from bats belong to the genus *Aonchotheca* López-Neyra, 1947 (earlier listed mostly in *Capillaria* s.l.), it is apparent that also the specimens found by Ryšavý (1956) belonged to this genus.

Rudolphi (1819) reported *Trichosoma vespertilionis* from the intestine of "*Vespertilio lasiopteri*" dissected in the Natural History Museum in Vienna; he gave no description, listing it among "*species dubiae*". Later Diesing (1851) designated as the type host *Vespertilio noctula* (= *Nyctalus noctula*). Travassos (1915) transferred *T. vespertilionis* to *Capillaria* s.l., but he designated it a *nomen nudum*. López-Neyra (1947) suggested its possible identity with *C. (= A.) speciosa* (Beneden, 1873), a poorly described species reported from the stomach of many bat species in Europe, including *Nyctalus noctula*.

During this study, a vial containing relatively well preserved specimens (1 male and 5 females) labelled as "*Capillaria vespertilionis* (Rud.)" from "*Vespertilio noctula*" was borrowed from the Natural History Museum in Vienna (cat. no. 6284); in our opinion, these nematodes can be considered conspecific with *Aonchotheca speciosa* (Beneden, 1873). At present, 11 capillariid species are reported from European bats but, in fact, all (except for *Aonchotheca moravecii* Esteban et al., 1991) are poorly described and, consequently, their validity is doubtful. The morphology of *A. moravecii* from *Myotis capaccinii* is in accordance with that of *A. speciosa*, as redescribed in this paper, and, therefore, the former species is considered a junior synonym of the latter. All other 5 species reported from *Myotis* spp. in Europe are poorly known and are probably identical with *A. speciosa* too. Therefore, the female capillariids reported by Ryšavý (1956) from *M. myotis* from former Czechoslovakia can be considered to be conspecific with *A. speciosa*.

Genus *Calodium* Dujardin, 1845

***Calodium hepaticum* (Bancroft, 1893) Moravec, 1982**

Trichocephalus hepaticus Bancroft, 1893

Hepaticola anthropopitheci Trostler, Deschiens, Limousin et Delormie, 1928

HOSTS. Mainly many species of rodents (e. g., *Apodemus*, *Arvicola*, *Clethrionomys*, *Ondatra*, *Rattus*), but also carnivores (*Canis*, *Felis*, *Vulpes*), primates (*Anthropopithecus*, *Cebus*) and some other mammals; accidentally also humans (*Homo sapiens*).

SITE. Liver parenchyma.

RECORDS IN CR AND SR. This species (only eggs) was first recorded as *Capillaria hepatica* by Erhardová & Ryšavý (1955) from the liver of *Apodemus flavicollis* from Lednice (CR) and the Vihorlat Mountains (SR) and by Erhardová (1958) from *A. flavicollis* and *Clethrionomys glareolus* from Prague and Lednice (CR) and the Vihorlat Mountains (SR). From the latter host species it was reported from Prague (CR) also by Rupeš (1961). In *Lepus europaeus* in the present Czech Republic it was found by Zajíček (1958). In Slovakia, this capillariid was reported by Mitúch (1960, 1963) from the livers of *Rattus norvegicus* from Lučenec, Sečovce and Trenčín (SR) and from *Vulpes vulpes* from Banská Bystrica (SR). Mokošiak (1960) found it in 0.67% of *R. norvegicus* examined in Brno (CR). Tenora & Zavadil (1967) listed previous published records of *Capillaria hepatica* (= *Calodium hepaticum*) from former Czechoslovakia and added their own finding of this parasite in *Ondatra zibethica* in Moravia (CR). Šlais & Štěrba (1972) and Šlais (1973) recorded it for the first time from the liver of a dead patient (*H. sapiens*) in Czechoslovakia (CR).

TAXONOMIC REMARKS. No specimens of this species were available. A detailed redescription of *C. hepaticum* is desirable. Most records of this parasite are based solely on the findings of eggs in the host's liver.

***Calodium soricicola* (Yokogawa in Nischigori, 1924) Moravec, 1982**

Hepaticola soricicola Yokogawa in Nischigori, 1924

Capillaria cholidicola Soltys, 1952

HOSTS. Insectivores (*Crocidura*, *Erinaceus*, *Neomys*, *Sorex*).

SITE. Liver.

RECORDS IN CR AND SR. Recorded by Prokopič (1958b, 1959) under the synonym *C. cholidicola* from the liver of *Sorex araneus* and *S. minutus* from southwestern Bohemia, southern Moravia and the Beskydy Mountains (CR) and from the High Tatras and White Carpathians (SR).

TAXONOMIC REMARKS. No specimens were available to study. The morphology of this species is poorly known and it urgently needs to be redescribed. Genov (1984), listing it in the genus *Hepaticola* Hall, 1916, synonymized *Capillaria cholidicola* with this species.

Genus *Eucoleus* Dujardin, 1845

***Eucoleus aerophilus* (Creplin, 1839) Dujardin, 1845**

(Fig. 6)

Trichoana aerophilum Creplin, 1839

DESCRIPTION (based on cotypes from the trachea of *V. vulpes*). Large sized nematodes with smooth cuticle. Laterally bands extending along body present. Anterior end narrowed, rounded, cephalic papillae indistinct. Stichosome formed by single row of 42–50 medium sized stichocytes with large

cell nuclei; most stichocytes somewhat darker (more granular) in posterior half and subdivided into about 10 transverse annuli. Pair of small glandular cells present at oesophago-intestinal junction.

Male. Length of body 16.65–19.99, maximum width 0.054–0.068. Width of lateral bacillary bands 0.030–0.033. Length of entire oesophagus 6.25–7.11 (32–40% of body length), of muscular oesophagus and stichosome 0.285–0.294 and 5.96–6.73, respectively; stichocytes 43–50 in number. Nerve ring 0.072–0.096 from anterior extremity. Spicule long, slender, weakly sclerotized, 1.10–1.27 long (representing 6.2–6.7% of body length) and 0.005 wide at middle part and 0.006–0.009 at somewhat expanded proximal end; distal end narrow, rounded. Spicular sheath elongate, densely covered by small spines about 0.003 long; length of evaginated sheath 0.243, maximum width 0.015. Posterior end of body blunt, provided with short dorsal caudal membrane forming bursa 0.003 long and 0.030 wide in ventral view; two round ventrolateral paracloacal lobes, each bearing one papilla, present. Cloacal opening almost terminal.

Female. Length of body of gravid specimens 23.05–29.92, maximum width 0.095–0.122. Width of bacillary bands 0.048–0.057. Length of entire oesophagus 5.96–6.49 (22–26% of body length), of muscular oesophagus and stichosome 0.312–0.330 and 5.63–6.16, respectively; stichocytes 42–46 in number. Nerve ring 0.078–0.090 from anterior extremity. Vulva situated 0–0.075 posterior to end of oesophagus; vulvar lips not elevated or anterior lip slightly elevated. Eggs in vagina arranged in one file, more distant eggs in many files. Mature eggs oval, thick-walled, unembryonated, with distinctly protruding polar plugs; egg shell two-layered, inner layer thin, hyaline, outer layer thicker, light-coloured, with distinct superficial net-like sculpture. Size of eggs including polar plugs 0.069–0.078×0.036–0.039, thickness of their wall 0.004–0.005; polar plugs 0.006–0.009 long and 0.006 wide, their protruding parts 0.002–0.003 high. Anus almost terminal, length of short tail 0.003. Rectum 0.075–0.102 long.

Hosts. Mainly various species of carnivores (*Canis*, *Felis*, *Lynx*, *Maris*, *Meles*, *Ursus*, *Vulpes*); reported also from humans (*Homo sapiens*).

Site. Larynx, trachea, large bronchi.

RECORDS IN CR AND SR. Konrád (1954) was the first to report this species (as *Capillaria aerophila*) from the trachea and bronchi, rarely also from the nasal cavity (in the latter case probably a misidentification of *E. boehmi*) in farmed fur animals; he did not mention any localities and it is not clear whether his data actually concerned findings in former Czechoslovakia. Later Prokopič (1960, 1965) reported it (as *Thominx aerophilus*) from the lungs of *Vulpes vulpes* from several localities (Jizerské Hory Mountains, surroundings of Písek, Mnichovo Hradiště) in Bohemia (CR) (prevalence 2.5%, intensity 3–23) and Mituch (1963) from the same host species from Slovakia (SR) (prevalence 28.5%). Svatoš (1963) recorded it from *Felis sylvestris* and *Lynx lynx* from Czechoslovakia. Recently Packová (1998) found eggs of *E. aerophilus* in the faeces of dogs (*Canis familiaris*) in Veverská Bítýška (CR). Šlapeta (1999) found eggs, reported as to probably belonging to *E. aerophilus*, in the faeces of hedgehogs (*Erinaceus concolor* and *E. europaeus*) but, in the fact, apparently these belonged to another species, *E. tenuis* (see p. 294).

TAXONOMIC REMARKS. The above mentioned description is based on specimens from *V. vulpes* from the Natural History Museum in Vienna (cat. no. 6263), designated as cotypes. Characteristic features of this species is mainly the structure of the male caudal end and of eggs.

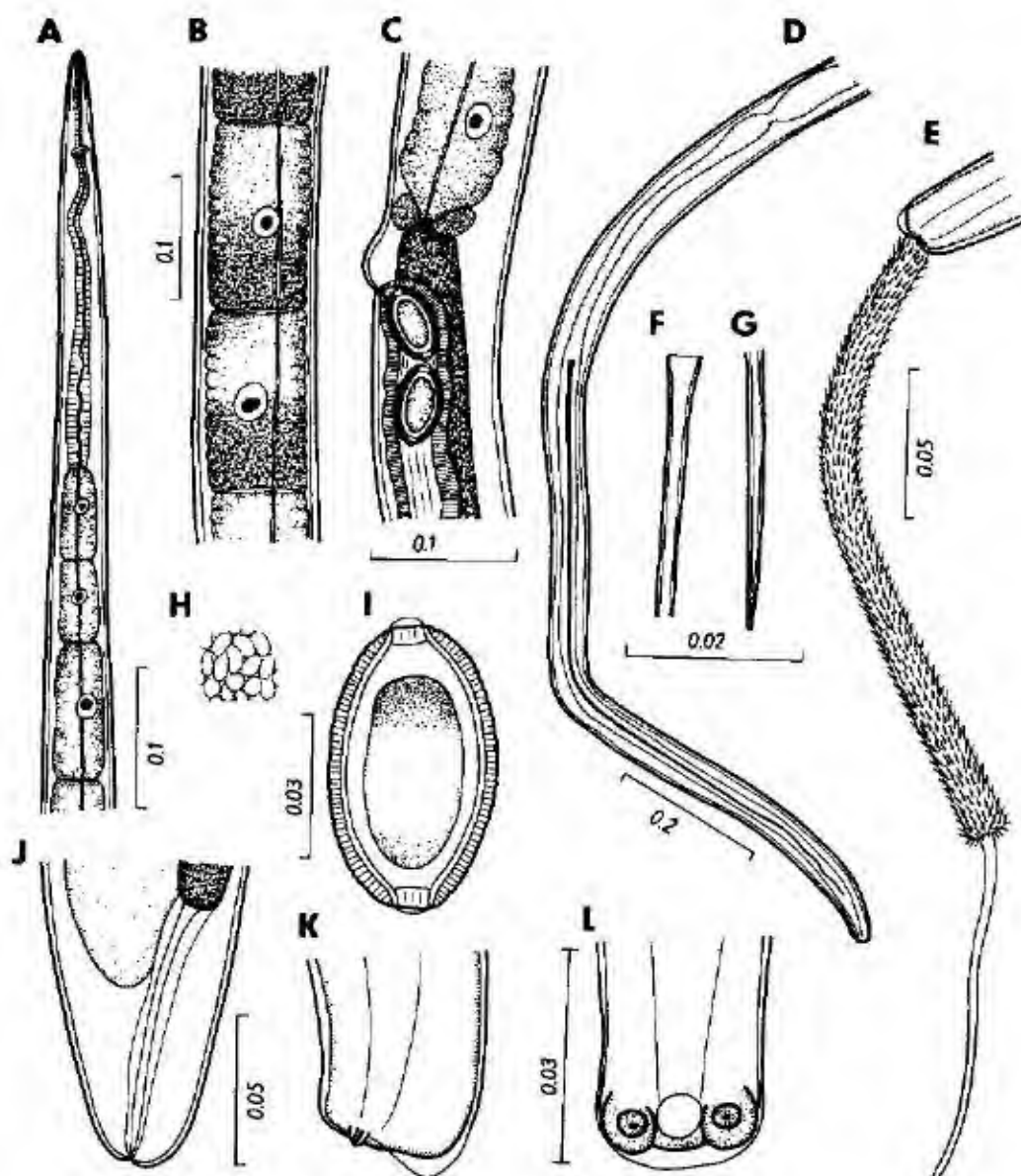


Fig. 6. *Eucoleus aerophilus* (Creplin) from *Vulpes vulpes*. A - anterior end of female; B - stichocytes in middle part of stichosome; C - region of vulva; D - posterior end of male; E - caudal end of male with evaginated spicular sheath; F, G - proximal and distal ends of spicule; H - superficial sculpture on egg; I - egg; J - posterior end of female; K, L - caudal end of male, lateral and ventral views. Scales in mm.

***Eucoleus bacillatus* (Eberth, 1863) López-Neyra, 1947**
(Fig. 7)

Trichosomum bacillatum Eberth 1863

DESCRIPTION OF MALE (based on newly collected specimen from *A. flavicollis*) Length of body fragment (most of oesophageal part absent, only posterior end of oesophagus including 3 stichocytes present) 1.8–2.2, maximum width 0.095. Conspicuously wide bacillary bands present, width 0.051. Stichocytes rather long, with large cell nuclei. Pair of small glandular cells present at oesophago-intestinal junction. Spicule long, slender, weakly sclerotized, difficult to observe, its proximal end somewhat expanded, distal end narrow, rounded, length of spicule 0.999. Spicular sheath elongate, densely covered by fine, long and narrow spines measuring 0.012, evaginated sheath 0.408 long and 0.024 wide. Posterior end of body rounded, provided with short dorsal caudal membrane forming very small bursa, two round subventral paraoccal lobes, each bearing one papilla, present. Cloacal opening almost terminal.

HOSTS. Murid rodents (*Apodemus*, *Mus*, *Rattus*).

SITE. Mucosa of oesophagus and stomach.

RECORDS IN CR AND SR. The only record of this species is that by Erhardová (1964), who reported it from the oesophagus of *Apodemus flavicollis* and *Rattus norvegicus* from Prague (CR). Her findings were later cited by Tenora & Zavadil (1967). One male of this species was found in the stomach mucosa in 1 out of 10 *A. flavicollis* examined in Lhenice, southern Bohemia (CR) in June 1997 (Moravec, unpublished).

TAXONOMIC REMARKS. The morphology of *E. bacillatus* is inadequately known. This species is very similar to *E. gastricus* and it may well be that subsequent studies will show the identity of both species.

***Eucoleus boehmi* (Supperer, 1953) Moravec, 1982**
(Fig. 8)

Capiliaria boehmi Supperer 1953

DESCRIPTION (based on specimens from nostrils of *V. vulpes*) Large sized nematodes with smooth cuticle. Lateral bacillary bands extending along body present, well visible. Anterior end narrowed, rounded, cephalic papillae indistinct. Stichosome formed by single row of 30–37 elongate stichocytes with large cell nuclei, their nucleoli containing several distinct corpuseles, most stichocytes subdivided into about 20 transverse annuli. 1–2 lighter-coloured stichocytes alternating with 1–2 darker [more granular] stichocytes. Pair of wing-like glandular cells present at oesophago-intestinal junction.

Male. Length of body 2.2–2.693, maximum width 0.082–0.095. Length of entire oesophagus 6.73–8.05 (30% of body length), of muscular oesophagus and stichosome 0.246–0.324 and 6.43–7.72, respectively, stichocytes 35–37 in number. Nerve ring 0.072–0.096 from anterior extremity. Spicule long, slender, weakly sclerotized, 1.11–1.83 long (forming 5.0–6.8% of body length) and 0.004 wide at middle part. Spicular sheath elongate, densely covered by small spines about 0.004 long, length of evaginated sheath 0.105–0.117, width 0.015. Posterior end of body rounded, provided with short dorsal caudal membrane forming bursa, two round ventrolateral paraoccal lobes, each bearing one papilla, present. Cloacal opening almost terminal.

Female. Length of body of gravid specimens 3.1–4.273, maximum width 0.122–0.150. Length of entire oesophagus 6.32–7.25 (17–21% of body length), of muscular oesophagus and stichosome 0.378–0.438 and 5.94–6.81, respectively, stichocytes 30–32 in number. Nerve ring 0.063–0.090 from

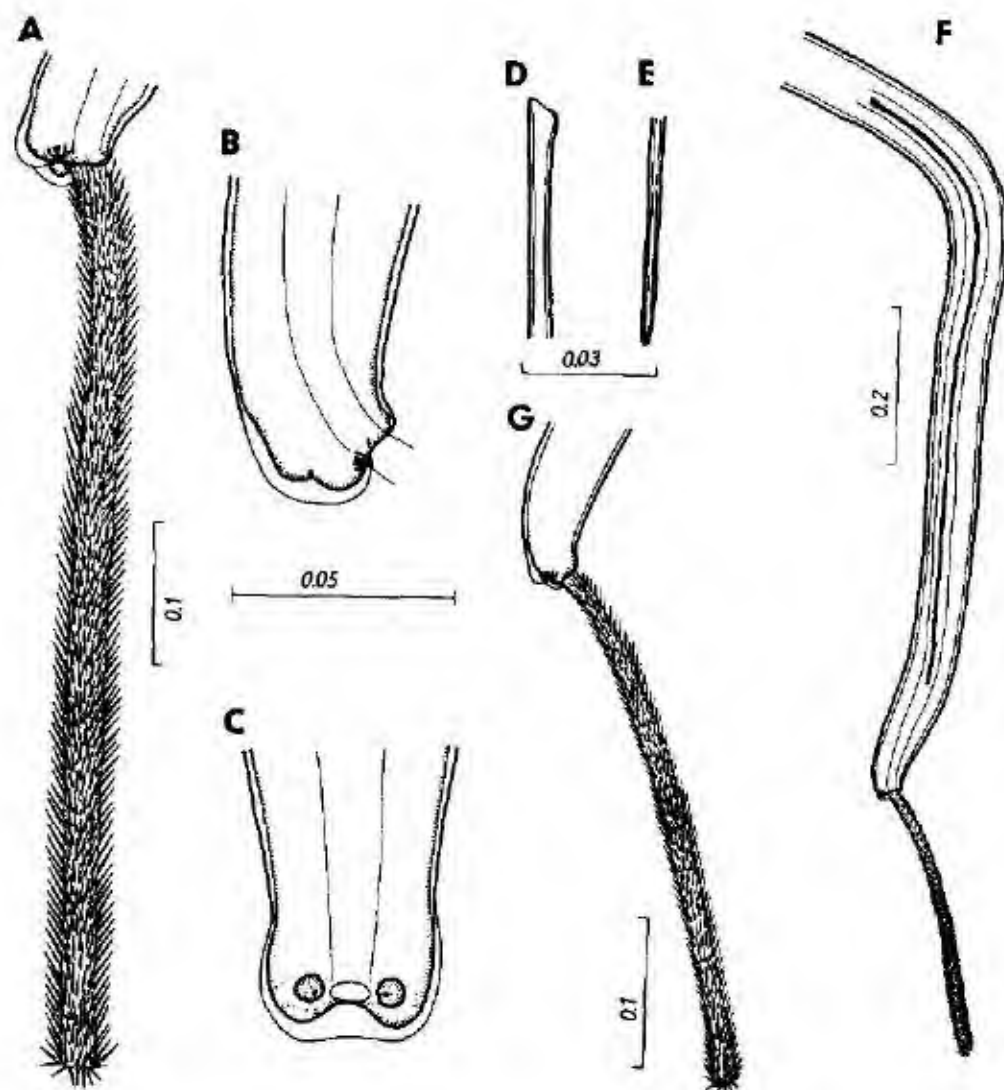


Fig. 7. *Eucoleus bacillans* (Eberth) from *Apodemus flavicollis*. A - caudal end of male with evaginated spicular sheath; B, C - caudal end of male, lateral and ventral views; D, E - proximal and distal ends of spicule; F - posterior end of male with evaginated spicular sheath; G - same, higher magnification. Scales in mm.

anterior extremity. Vulva situated at level of end of oesophagus; vulvar lips not elevated. Mature eggs oval, unembryonated, with slightly protruding polar plugs; egg shell two-layered, inner layer thin, hyaline, outer layer thicker, with porous appearance on surface. Size of eggs including polar plugs $0.060-0.066 \times 0.030-0.033$, thickness of their wall 0.003 , polar plugs 0.006 long and 0.006 wide. Anus terminal. Rectum $0.105-0.138$ long.

Hosts. Carnivores (*Canis*, *Vulpes*).

Site. Frontal sinuses, nostrils.

RECORDS IN CR AND SR. Supperer (1953) reported this species as *Capillaria böhmi* from foxes *Vulpes argentina* and *V. vulpes* from northern Moravia (CR) (besides records from Austria). Later Prokopič (1965) found it (reported as *Thominx böhmi*) in frontal sinuses of *V. vulpes* (prevalence 0.5%) in Ondřejov, Bohemia (CR).

TAXONOMIC REMARKS. The morphology of *E. boehmi* is very similar to that of *E. aerophilus*; both species principally differ in the types of the superficial sculpture on eggs and in the site of infection in the host, besides a few additional, less obvious morphological differences (Zarnowski & Patyk 1960, Campbell & Little 1991). The above description of *E. boehmi* is based on museum specimens collected by Mehlis from the nostrils of *V. vulpes* in Germany and designated as *Capillaria* sp.

***Eucoleus gastricus* (Baylis, 1926) López-Neyra, 1947**
(Fig. 9)

Hepaticola gastrica Baylis, 1926

Hepaticola muris Uyeyama, 1928

Hepaticola cancerogena Beatti, 1930

DESCRIPTION (based on newly collected specimens from *R. norvegicus*): Larger sized nematodes with smooth cuticle. Lateral bacillary bands extending along body present. Anterior end narrowed, rounded, cephalic papillae indistinct. Stichosome formed by single row of elongate, light-coloured stichocytes not divided into transverse annuli; cell nuclei large. Pair of wing-like glandular cells present at oesophago-intestinal junction.

Male. Body length not determined (only body fragments available), maximum width $0.054-0.069$. Width of lateral bacillary bands 0.030 . Spicule slender, weakly sclerotized, 1.33 long and 0.003 wide at middle part, difficult to observe. Invaginated spicular sheath with numerous elongate spines. Posterior end of body rounded, provided with short caudal membrane forming bursa 0.042 wide; two round ventrolateral paracloacal lobes, each bearing one papilla, present. Additional pair of subventral papillae appearing to be present anterior to level of cloacal opening. Length of caudal membrane $0.003-0.006$. Cloacal opening subterminal. Length of tail including caudal membrane $0.018-0.021$.

Female. Length of body of gravid females $24.14-32.55$, maximum width $0.075-0.102$. Length of entire oesophagus $6.83-8.60$ ($26-28\%$ of body length), of muscular oesophagus and stichosome $0.366-0.369$ and $5.46-8.23$, respectively. Nerve ring $0.075-0.087$ from anterior extremity. Vulva situated $0-0.060$ posterior to end of oesophagus; vulvar lips not elevated. Mature eggs oval, unembryonated, with markedly protruding polar plugs; egg shell two-layered, inner layer hyaline, outer layer with fine superficial sculpture. Size of eggs including polar plugs $0.072-0.075 \times 0.027-0.030$ (length without protruding parts of polar plugs $0.057-0.063$), thickness of their wall 0.002 ; polar plugs 0.012 long and 0.009 wide, length of their protruding parts 0.006 . Anus subterminal, length of tail 0.012 . Rectum 0.189 long.

Hosts. Murid rodents (*Microtus*, *Mus*, *Rattus*).

Site. Stomach, oesophagus.

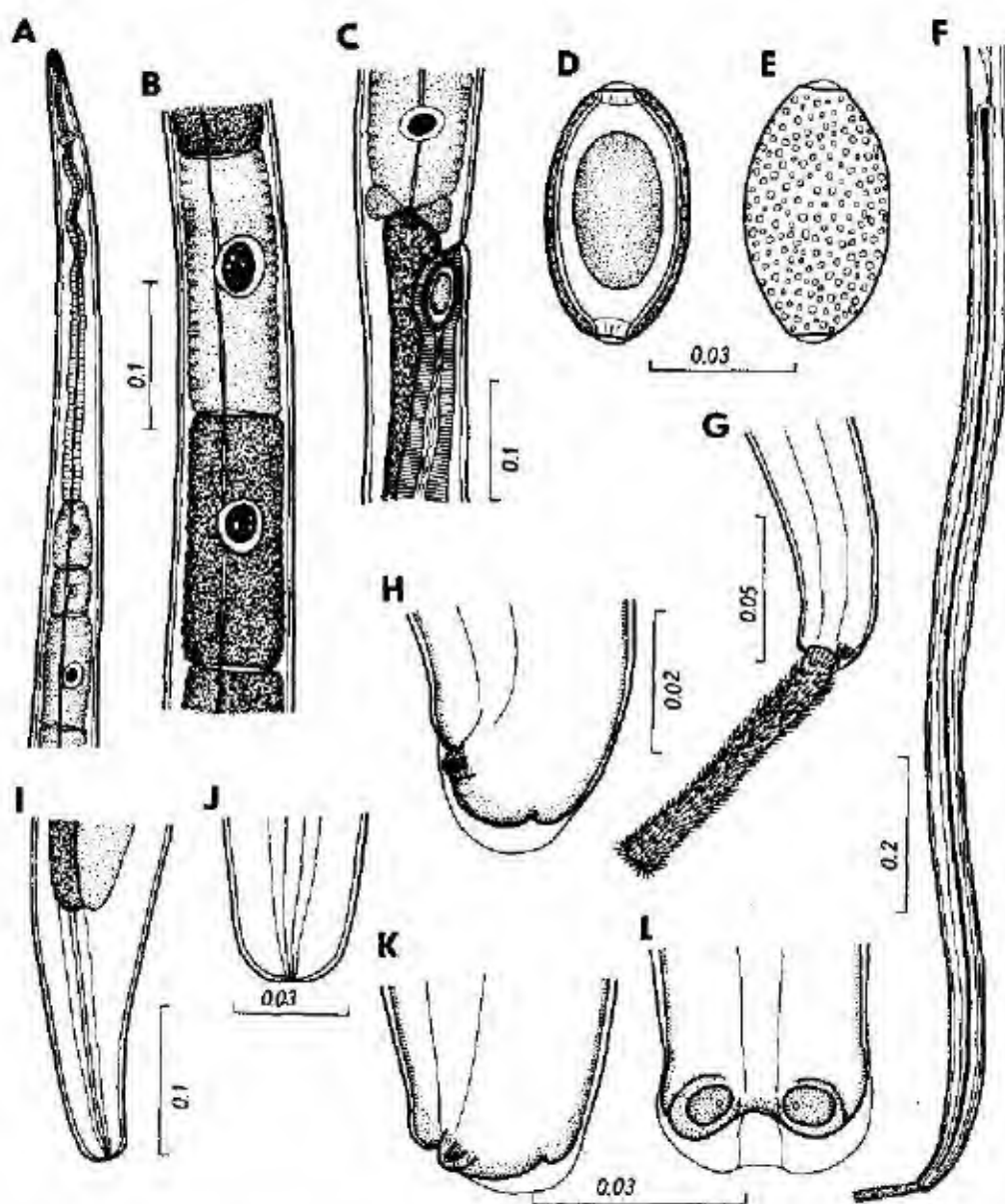


Fig. 3. *Eucoleus boehmi* (Supperer) from *Vulpes vulpes*. A - anterior end of female; B - stichocytes in middle part of stichosome; C - region of vulva; D - egg; E - egg with marked superficial sculpture; F - posterior end of male; G - caudal end of male with evaginated apical sheath; H - caudal end of male, lateral view; I - posterior end of female; J - caudal end of female; K, L - caudal end of male, lateral and ventral views. Scale bars in mm.

RECORDS IN CR AND SR. This species (as *Thominx gastrica*) was first reported from the stomach wall of *Rattus norvegicus* (prevalence 5%) from zoo in Prague (CR) by Erhardová (1960). Later the same author (Erhardová 1964) reported it from the same host species from Prague (CR) and Tenora & Zavadil (1967) overtook her data in their list of capillariids parasitizing rodents in Czechoslovakia. Six specimens of this species were collected from the mucosa of the oesophagus of one occasionally examined rat, *R. norvegicus*, caught in České Budějovice (CR) in November 1990 (Moravec, unpublished).

TAXONOMIC REMARKS. The morphology of *E. gastricus* is insufficiently known. This species is very similar to *E. bacillatus* and it may well be that subsequent studies will show their identity.

Eucoleus oesophagicola (Soltys, 1952)

Skryabin, Shikhobalova, Sobolev, Paramonov et Sudarikov, 1954

(Fig. 10)

Capillaria oesophagicola Soltys, 1952

Capillaria blarinae Ogren, 1953

Capillaria uschnarini Nadtocii et Razumowa, 1971

Eucoleus bernardi Romashov, 1983

DESCRIPTION (based on newly collected specimens from *N. anomalus*). Medium sized nematodes. Lateral bacillary bands extending along body present. Anterior end narrowed, rounded, cephalic papillae indistinct. Stichosome formed by single row of about 50 medium sized stichocytes without transverse annuli; cell nuclei large. Pair of small glandular cells present at oesophago-intestinal junction.

Male. Length of body 10.27, maximum width 0.068. Length of entire oesophagus 3.78 (37% of body length), of muscular oesophagus and stichosome 0.291 and 3.49, respectively; stichocytes 50 in number. Nerve ring 0.069 from anterior extremity. Spicule not visible. Spicular sheath armed with numerous small spines; evaginated sheath 0.045 long and 0.018 wide, bearing sparsely distributed minute spines. Posterior end of body narrowed. Caudal end blunt, provided with short dorsal caudal membrane forming bursa; length of caudal membrane 0.006. Two round ventrolateral para-cloacal lobes, each bearing one papilla, present. Cloacal opening subterminal. Length of tail including membranous bursa 0.015.

Female. Length of body of gravid specimens 10.40–11.99, maximum width 0.082–0.095. Width of lateral bacillary bands 0.042. Length of entire oesophagus 4.08–4.53 (38–39% of body length), of muscular oesophagus and stichosome 0.303–0.330 and 3.78–4.20, respectively; stichocytes 47–50 in number. Nerve ring 0.084–0.087 from anterior extremity. Vulva 0.090–0.150 posterior to end of oesophagus, vulvar lips not elevated or anterior lip somewhat elevated. Eggs near vulva in one file. Mature eggs oval, thick-walled, unembryonated, their polar plugs not protruding; egg shell two-layered, inner layer thin, hyaline, outer layer thick, light-coloured, with rough sculpture on surface. Size of eggs 0.069–0.075 × 0.030–0.033, thickness of their wall 0.003–0.005; polar plugs 0.006 long and 0.006 wide. Anus terminal. Length of rectum 0.066–0.111.

Hosts. Insectivores (*Neomys*, *Sorex*).

SITE. Mucosa of oesophagus; also stomach and intestine according to Prokopič (1959).

RECORDS IN CR AND SR. Prokopič (1957a, c, 1959) reported this species, under the synonyms *Capillaria* or *Thominx blarinae*, from the oesophagus, stomach and intestine of *Sorex minutus* from the Krkonoše Mountains, western and central Bohemia and the Beskydy Mountains (CR) and from the High Tatras (SR). Later Mészáros & Stollmann (1984) and Murai & Mészáros (1984) found it in *Sorex araneus* from the Western Carpathians Mountains (SR). Five specimens of this species

were collected from the oesophageal mucosa of one occasionally examined Miller's water shrew, *Neomys anomalus*, from Borovany, southern Bohemia (CR) in August 1986 (Moravec, unpublished).

TAXONOMIC REMARKS. Romashov (1983) described a new species, *Eucoleus bernardi*, from the oesophagus of the water shrew, *Neomys fodiens*, from Russia, differentiating it from *E. oesophagicola* by morphological features which were, in our opinion, within the morphological variability of *E. oesophagicola*. Both *N. fodiens* and *N. anomalus* were reported by Genov (1984) as hosts of *Thominx* (= *Eucoleus*) *oesophagicola*. Therefore, *E. bernardi* should be considered a junior synonym of *E. oesophagicola*.

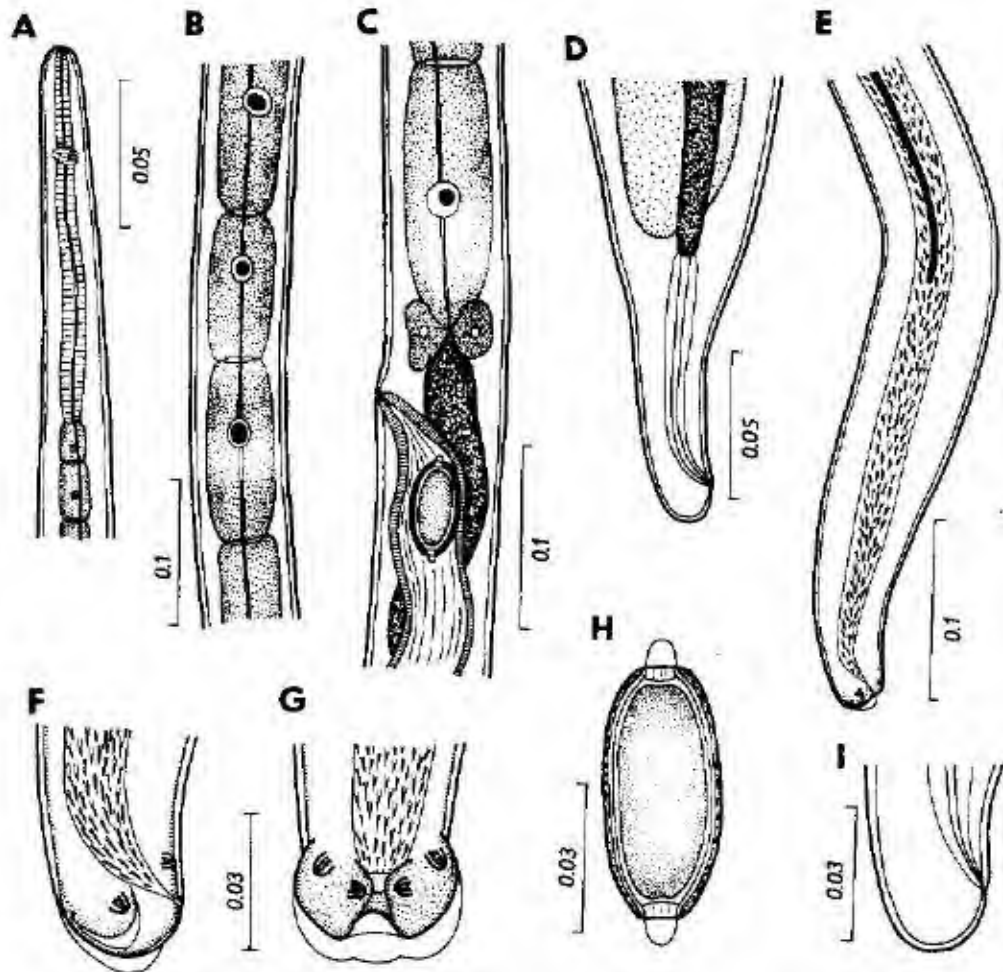


Fig. 9. *Eucoleus gastricus* (Baylis) from *Rattus norvegicus*. A – anterior end of female; B – stichocytes in middle part of stichosome; C – region of vulva; D – posterior end of female; E – posterior end of male; F, G – caudal end of male, lateral and ventral views; H – egg; I – caudal end of female. Scale bars in mm.

***Eucoleus tenuis* Dujardin, 1845**

(Fig. 11)

DESCRIPTION (based on available body fragments from *E. europaeus*). Medium sized nematodes. Anterior end narrowed, rounded, cephalic papillae indistinct. Stichosome formed by single row of medium sized stichocytes, most of them being subdivided into about 10 transverse annuli, cell nuclei large. Pair of small glandular cells present at oesophago-intestinal junction.

Male. Body length not determined, maximum width 0.068–0.082. Length of entire oesophagus 2.44, of muscular oesophagus and stichosome 0.330 and 2.11, respectively; stichocytes 39 in number. Nerve ring 0.084 from anterior extremity. Spicule indistinct. Spicular sheath elongate, densely covered by small, thin spines 0.003–0.004 long; evaginated sheath 0.042–0.144 long and 0.015–0.018 wide. Posterior end blunt, provided with short dorsal caudal membrane forming bursa; two round ventrolateral paraclonal lobes, each bearing one papilla, present. Cloacal opening almost terminal. Width of caudal end of body 0.024–0.030.

Female. Body length not determined, maximum width 0.095. Vulva at level of oesophagus end, vulvar lips not elevated. Eggs arranged in one file near vulva, more distant eggs in two files. Eggs oval, thin-shelled, unembryonated, with distinctly protruding polar plugs; egg shell two-layered, inner layer thin, hyaline, outer layer slightly thicker, with fine net-like sculpture on surface. Size of eggs including polar plugs 0.066–0.078×0.036–0.042, egg shell 0.003 thick; polar plug 0.006–0.009 long and 0.006–0.007 wide, its protruding part 0.003 high. Anus terminal.

HOSTS. Hedgehogs (*Erinaceus*).

SITE. Bronchi, lungs.

RECORDS IN CR AND SR. Prokopič (1957d, 1959) found this species in bronchi and lungs in 6% of *Erinaceus concolor* and *E. europaeus* (intensity 2–18 nematodes) examined from Prague and Olomouc (CR). During a coprological examination of both species of hedgehogs from central Bohemia and Brno (CR), Šlapeta (1999) found the eggs which were considered by him to belong either to *E. tenuis* or *E. aerophilus*.

TAXONOMIC REMARKS. The morphology of this species is inadequately known and, therefore, its detailed redescription is urgently needed. In the veterinarian literature, another species, *E. aerophilus*, has frequently been reported to be parasitic in hedgehogs. However, already López-Neyra (1947) pointed out that these were misidentifications and, in fact, *E. tenuis* was mistaken for *E. aerophilus*. Both species are similar, but can be distinguished, for example, by the structure of the stichosome, egg shells, and body sizes.

Genus *Liniscus* Dujardin, 1845

***Liniscus incrassatus* Diesing, 1850**

Trichostrongylus (*Liniscus*) *incrassatus* Diesing, 1850

Trichostrongylus capillaris Linstow, 1882

Capillaria linstowi Travassos, 1914

Capillaria exilis Siles et Stanley, 1932

Capillaria sinica Chen, 1937

Capillaria urticae Soltys, 1952

HOSTS. Insectivores (*Crocidura*, *Neomys*, *Sorex*, *Talpa*).

SITE. Urinary bladder.

RECORDS IN CR AND SR. Prokopič (1957c, 1958b, 1959) reported this species as *Capillaria capillaris* from the urinary bladder of *Crocidura russula*, *Neomys fodiens*, *Sorex araneus* and *S. minutus* from the Šumava Mountains, southern and western Bohemia (Jindřichův Hradec, Volyně) and

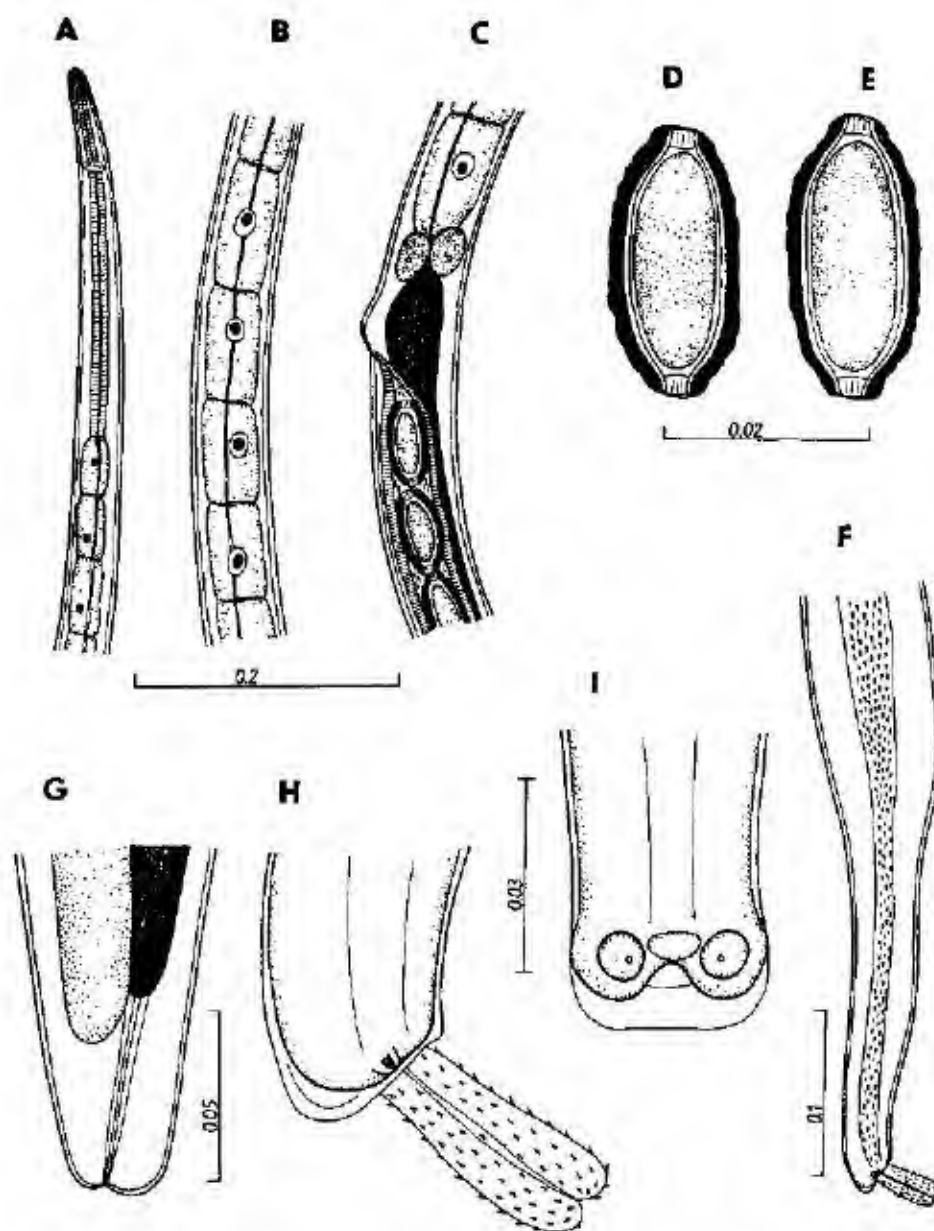


Fig. 10. *Eucolpus vesophagicola* (Soltys) from *Neomys anomalus*. A - anterior end of female; B - stichocytes in middle part of stichosome; C, D - mature eggs; F - posterior end of male; G - caudal end of female; H - caudal end of male with evaginated spicular sheath; I - caudal end of male, ventral view. Scale bars in mm.

southern Moravia (CR) and from the High Tatras (SR). From Slovakia, it was also recorded as *Capillaria incrassata* by Mészáros & Štollmann (1984) and Murai & Mészáros (1984) from *S. araneus* from the Western Carpathians Mountains (SR).

TAXONOMIC REMARKS. The morphology of this species is inadequately known and a detailed redescription of *L. incrassatus* is highly desirable. The available type specimens of *T. capillare* Linstow, 1882 proved to be useless because of their poor condition.

***Liniscus papillosus* (Polonio, 1860) Moravec, 1982**

Calodium papillosum Polonio, 1860

Trichosoma schmidtii Linstow, 1874

HOSTS. Rodents (*Cricetus*, *Mus*, *Rattus*).

SITE. Urinary bladder.

RECORDS IN CR AND SR. The only record of this species (as *Capillaria papillosa*) is that by Mituch (1960) from the urinary bladder of *Rattus norvegicus* (total prevalence 0.72%, intensity 1–5 nematodes) from Slovak localities Bytča, Kráľovský Chlmec, Ružomberok and Trebišov (SR).

TAXONOMIC REMARK. The morphology of this species is poorly known and a detailed redescription of *L. capillaris* is urgently needed.

Genus *Pearsonema* Freitas et Mendonça, 1960

***Pearsonema mucronata* (Molin, 1858) Moravec, 1982**

Calodium mucronatum Molin, 1858

HOSTS. Carnivores (*Martes*, *Mustela*).

SITE. Urinary bladder.

RECORDS IN CR AND SR. The only record of this species (as *Capillaria mucronata*) is that by Prokopič (1965) reporting it from the urinary bladder of *Martes foina* (prevalence 1.8%, intensity 1–11 nematodes) from Mnichovo Hradište (CR).

TAXONOMIC REMARKS. The morphology of this species is poorly known and it cannot be excluded that it is identical with *P. plica*. The available museum specimens from *M. foina* (small body fragments) were useless because of their poor condition, but some morphological features seemed to be similar to those of *P. plica*.

***Pearsonema plica* (Rudolphi, 1819) Moravec, 1982**
(Fig. 12)

Trichosoma plica Rudolphi, 1819

Trichosoma canis-vulpes Bayer, 1843

DESCRIPTION (based on specimens from *V. vulpes*; measurements of types from *C. lupus* in parentheses). Larger sized nematodes. Body markedly long and slender. Lateral bacillary bands extending along body present, relatively narrow, inconspicuous. Anterior end narrow, rounded, cephalic papillae indistinct. Muscular oesophagus comparatively long. Stichosome formed by single row of markedly elongate, light-coloured stichocytes, mostly subdivided into about 12–22 transverse annuli; cell nuclei large. Pair of wing-like glandular cells present at oesophago-intestinal junction.

Male. Length of body 28.18–29.95, maximum width 0.054–0.068. Width of lateral bacillary bands 0.012–0.015. Length of entire oesophagus 7.34–7.83 (26–27% of body length), of muscular oesophagus

gus 0.330–0.370, stichocytes 36–43 in number. Nerve ring 0.078–0.108 from anterior extremity. Seminal vesicle 0.979–1.142. Spicule thin, smooth 2.53–3.56 (5.10–5.21) long (8.4–12.5% of body length), proximal end somewhat expanded, distal end rounded, width of spicule at proximal end, middle part and distal end 0.021–0.024, 0.006 and 0.009, respectively. Spicular sheath nonspinous, elongate, narrow, length of evaginated sheath 0.54–2.65, width 0.012–0.021. Posterior end of body blunt, provided with large triangular dorsal membrane forming bursa supported by two lateral, finger-shaped, anteriorly directed processes (rays), length of caudal bursa 0.00–0.15 (0.018). Cloacal opening subterminal. Lateral caudal alae absent.

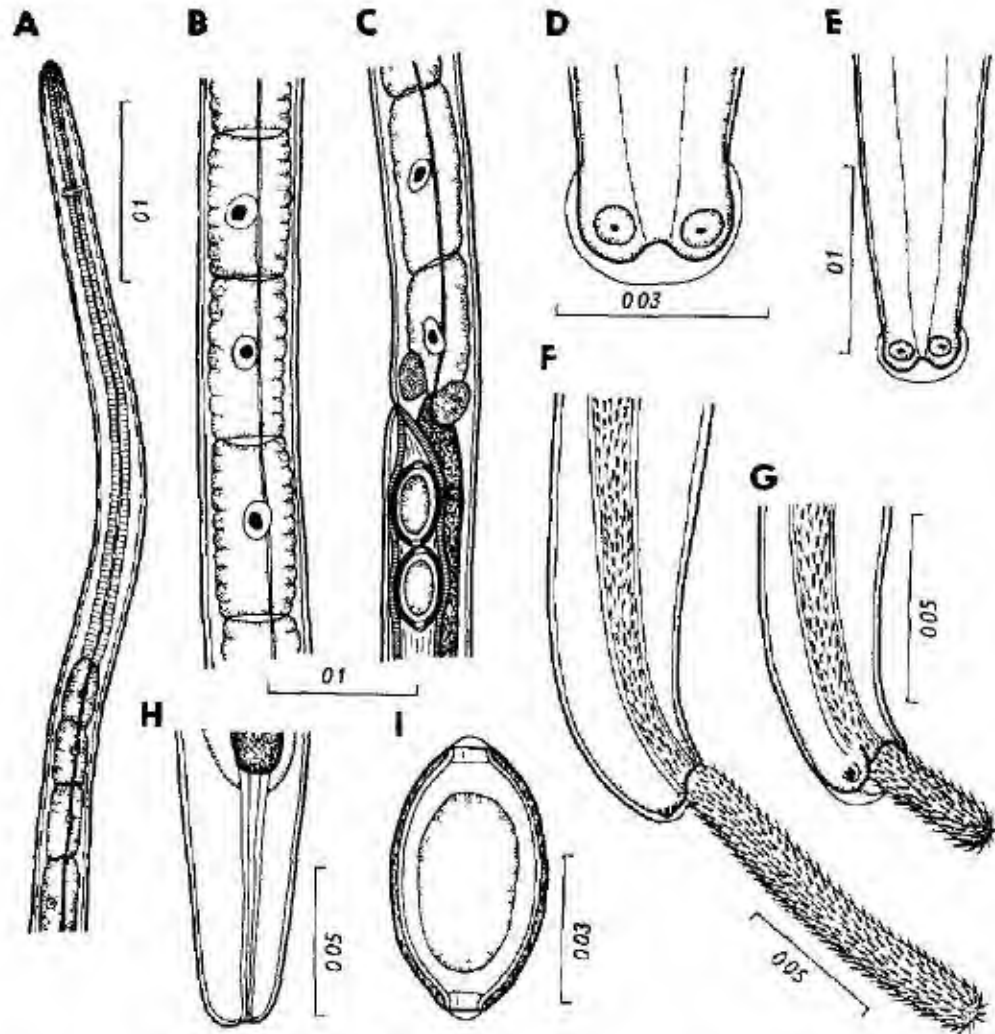


Fig. 11. *Eucalen tenuis* Dujardin from *Talpa europaea*. A – anterior end of female, B – stichocytes in middle part of stichosome, C – region of vulva, D – caudal end of male, ventral view, E – posterior end of male, ventral view, F – caudal end of male with evaginated spicular sheath, G – same, another specimen. Scale bars in mm.

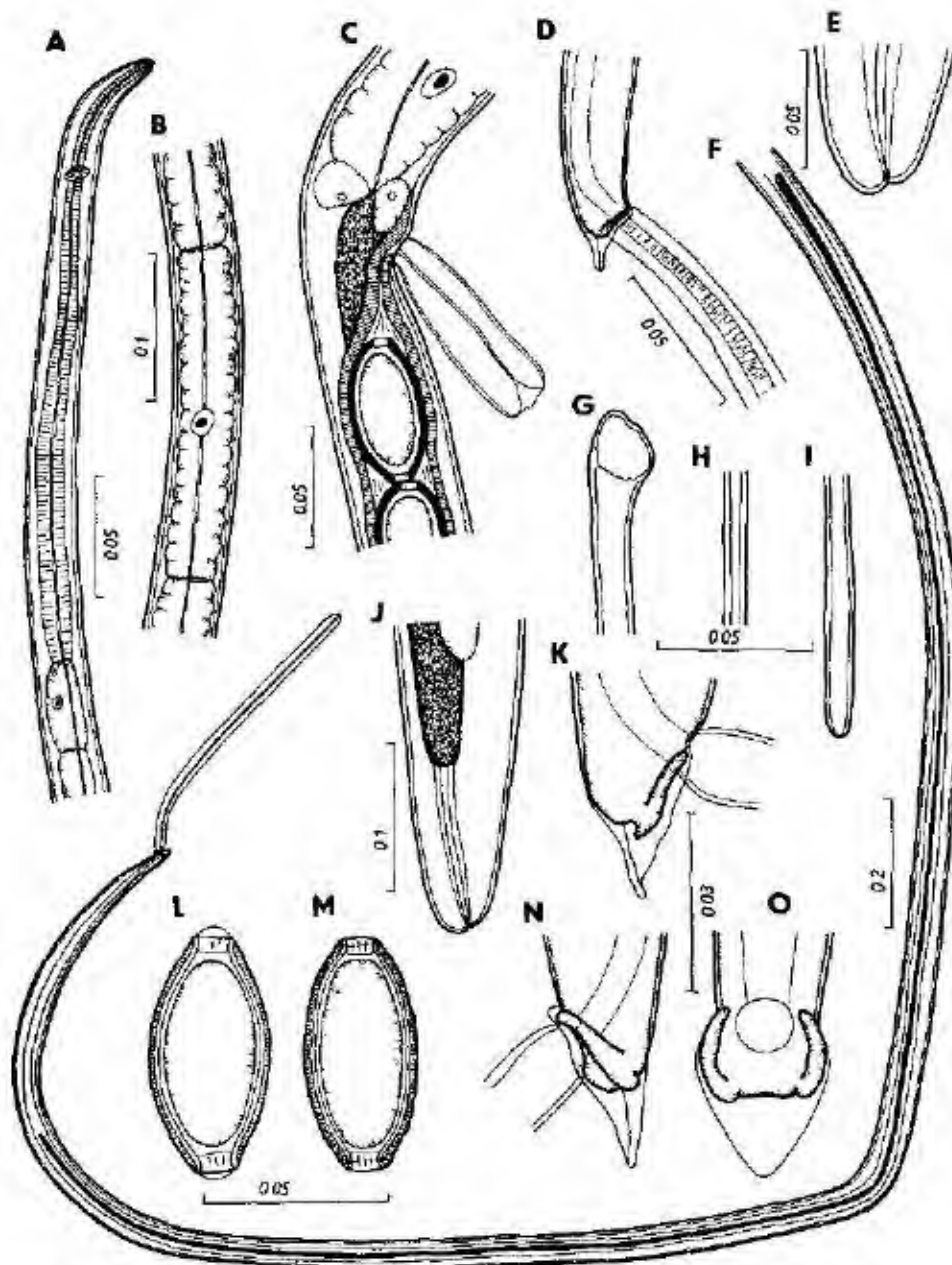


Fig. 12. *Pectonema plica* (Rudolphi). A - anterior end of female, B - stichocyte in middle part of stichosome, C - region of vulva, D - caudal end of male, E - posterior extremity of female, F - posterior end of male with evaginated spicular sheath, G, H, I - proximal, middle and distal parts of spicule, J - posterior end of female, K - caudal end of male, lateral view, L, M - mature egg, N, O - caudal end of male, lateral and ventral views (A-L and A, O based on specimens from *Vulpes vulpes*, M - from *Canis lupus* [cotype]). Scale bars in mm.

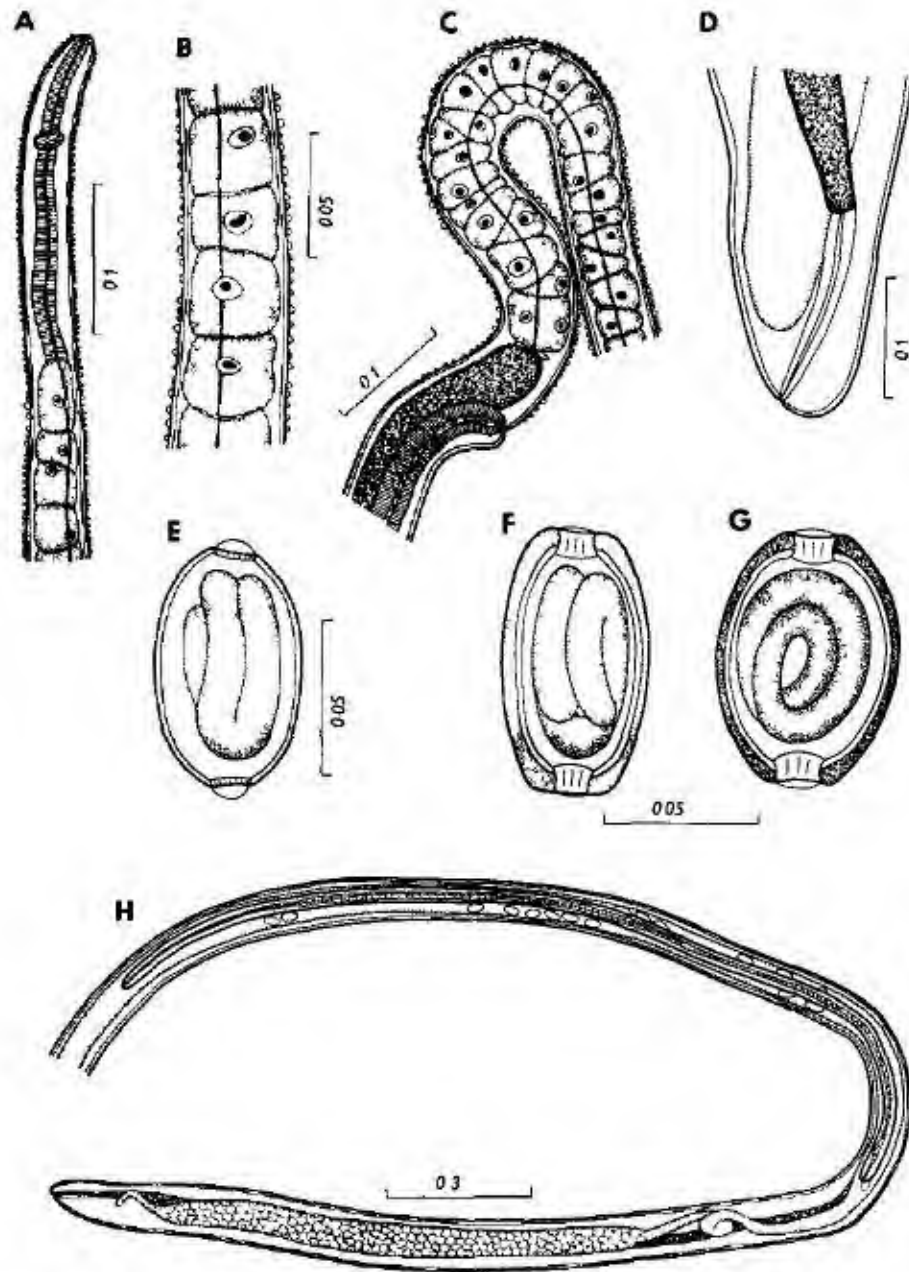


Fig. 13 *Trichosomoides crassicauda* (Hollingham) from *Rattus norvegicus*. A – anterior end of female, B – stichocytes in middle part of stichosome, C – region of vulva, D – posterior end of female, E – thin-walled egg, F, G – thick-walled eggs, H – posterior part of female body with male inside uterus. Scales in mm.

Female. Length of body of gravid specimens 28.16–34.82, maximum width 0.122–0.136. Width of lateral bacillary bands 0.018. Length of entire oesophagus 8.73–9.11 (26–31% of body length), of muscular oesophagus 0.360–0.363; stichocytes 45–46 in number. Nerve ring 0.081–0.126 from anterior extremity. Vulva situated 0.030–0.075 posterior to end of oesophagus; vulvar lips not elevated; elongate vulvar appendage present, 0.093–0.102 long and 0.030 wide. Eggs near vulva in single file. Mature eggs oval, usually with somewhat protruding polar plugs (in older eggs polar plugs not protruding); egg shell two-layered, inner layer thin, hyaline, outer layer thicker, with distinct, relatively rough net-like sculpture on surface; content of eggs uncleaved. Size of eggs including polar plugs 0.069–0.072×0.033–0.036 (0.057–0.069×0.030–0.033); egg wall 0.003 thick; length of whole polar plug 0.009, of their protruding parts up to 0.006. Anus almost terminal, length of tail 0.006. Rectum 0.140 long.

Hosts. Carnivores (*Canis*, *Vulpes*).

Site. Urinary bladder.

RECORDS IN CR AND SR. Under the synonym *Capillaria plica*, this parasite was recorded by Mituch (1963) from *Canis lupus* (prevalence 4.1%) from Javorina, Poprad District (SR) and by Prokopič (1965) from the farmed *Vulpes vulpes* (prevalence 0.5% in Martinice (CR). Numerous specimens of this species from wild *V. vulpes* from central Bohemia (CR) were provided by I. Pavlásek, State Veterinary Institute in Prague in 1997 (Moravec, unpublished).

TAXONOMIC REMARKS. The spicule of specimens from *V. vulpes* used for the above description was distinctly shorter (2.53–3.56 mm) than that found in Rudolphi's type specimens from *C. lupus* (5.10–5.21 mm); this is apparently within the intraspecific variability of this species; in an additional material of *P. plica*, consisting of damaged specimens from the urinary bladder of *V. argentina* and *V. vulpes* from Germany, the spicule was found to be 4.60–4.88 mm. This species seems to be morphologically very similar to *P. micronata* and subsequent studies may show that both species are identical.

Species considered as *species inquirenda*

Nematoideum talpae Siebold, 1850 (*species inquirenda*)

Host. Common mole, *Talpa europaea* (Insectivora).

Site. Intestine.

RECORDS IN CR AND SR. This species was first reported by Prokopič (1957b) as *Capillaria talpae* from the small intestine of *T. europaea* from Prague (CR) and Mudražovo (SR) with the overall prevalence 25% and intensity 3–17 nematodes. Later he (Prokopič 1959) reported it from the same host species from Prague, eastern and southern Bohemia (CR) and southern Slovakia (SR).

TAXONOMIC REMARKS. No specimens of this species were available. The existing descriptions of this species are poor so that it may not be assigned to any genus of the present classification system of capillariids. Consequently, the species should be considered a *species inquirenda*. A description of intestinal capillariids parasitizing *T. europaea* is highly desirable.

Family Trichosomoididae Hall, 1916
Genus *Trichosomoides* Railliet, 1895

***Trichosomoides crassicauda* (Bellingham, 1840) Railliet, 1895**
(Fig. 13)

Trichosoma crassicauda Bellingham 1840

Trichosoma muris decuman Bayer in Stossich 1890

DESCRIPTION (based on newly collected specimens from *R. norvegicus*) Nematodes with high degree of sexual dimorphism, males very small, living in female uterus. Anterior end of body narrowed, rounded, cephalic papillae indistinct. Stichocytes short, numerous. Pair of pseudocoelomatic cells at oesophago-intestinal junction highly reduced.

Male. Length of body 2.27, maximum width 0.030. Cuticle smooth. Stichosome approximately twice as long as muscular oesophagus. Posterior end of body rounded, cloacal opening terminal. Spicule, specular sheath or caudal bursa or papillae absent.

Female. Length of body of gravid specimens 11.65–15.60, maximum width 0.109–0.231. Cuticle covered by numerous small cuticular bosses distributed mainly in region of posterior part of stichosome, maximum high of bosses 0.003–0.008. Lateral bacillary bands extending along body present, 0.024 wide. Length of entire oesophagus 1.80–2.01 (12–16% of body length), of muscular oesophagus and stichosome 0.195–0.246 and 1.55–1.77, respectively. Stichosome composed of 54–60 light-coloured, mostly conspicuously short stichocytes arranged in one row but, sometimes, posterior stichocytes may be in two rows, cell nuclei large, not arranged in one row, size of stichocytes 0.024–0.045 × 0.030–0.048. Nerve ring 0.063–0.090 from anterior extremity. Vulva situated 0.018–0.078 posterior to end of oesophagus, vulvar lips not elevated or posterior lip slightly elevated. Eggs numerous, embryonated, being arranged in one file near vulva and in two or more files in more posterior region of uterus, a few eggs near vulva barrel-shaped or oval, markedly thick-shelled, brownish, with not protruding polar plugs, more distant eggs oval, thin-walled, colourless, embryonated, with distinctly protruding polar plugs. Mature eggs including polar plugs 0.066–0.078 × 0.033–0.051, polar plugs 0.006 long and 0.009 wide, length of their protruding parts up to 0.004. In specimens studied, 1–2 males present in uterus in addition to eggs. Ovary rather short and wide, extending posteriorly to region of rectum. Posterior end rounded, anus subterminal or almost terminal, length of tail 0.003–0.009. Rectum 0.120–0.180 long.

HOSTS. Murid rodents, mainly rats (*Apodemus*, *Rattus*).

SITE. Urinary bladder.

RECORDS IN CR AND SR. Erhardova (1958) reported it from the urinary bladder of *Rattus norvegicus* from Prague and Brno (CR) and Bratislava (SR) and Mituch (1960) from the same host species (prevalence 0.54%, intensity 2–33 nematodes) from Galanta and Hlohovec (SR). Tenora and Tomanek (1963) found it in *R. norvegicus* (prevalence 5%, intensity 1–15) in Opava (CR). Five females containing males of *T. crassicauda* were found in one occasionally examined *R. norvegicus* from České Budějovice in November 1990 (Moravec, unpublished).

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**New palaearctic species of the genera *Anthocopa* and *Hoplitis*
(Hymenoptera: Apoidea: Megachilidae)**

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Abstract. In the present paper the following new taxa are described: *Anthocopa* (*Arctosmia*) *graeca* sp. n. from southern Greece with its ssp. *ionica* ssp. n. from western Turkey, *Anthocopa* (*Arctosmia*) *brevispina* sp. n. from eastern Turkey and Caucasus [both compared with the closely related *A. villosa* (Schenck) and *A. unispina* (Alfken) type-material of the latter species is studied], *Hoplasma* (*Odontanthocopa*) *iarochaei* (Tkalců), new male, *Hoplitis* (*Micrerisades*) *haemi* sp. n. from Bulgaria, *Hoplitis* (*Micrerisades*) *antalyae* sp. n., *Hoplitis* (*Micrerisades*) *pauhae* sp. n. both from southern Turkey, *Hoplitis* (*Liasmia*) *ozbeki* sp. n. from eastern Turkey and Caucasus, *Hoplitis* (*Liasmia*) *mollis* sp. n. from Turkey and Bulgaria, *Hoplitis* (*Arctosmia*) *karszabi* sp. n. from Mongolia, *Hoplitis* (*Hoplitis*) *quellensis* sp. n. from Pakistan, *Hoplitis* (*Hoplitis*) *monstrabilis* sp. n., *Hoplitis* (*Hoplitis*) *erzurumensis* sp. n. both from Turkey (lectotype of *Osmia lapidaria* Morawitz is studied).

Taxonomy, descriptions, Hymenoptera, Apoidea, Megachilidae, *Anthocopa*, *Hoplitis*, Palaearctic region

***Anthocopa* (*Arctosmia*) *graeca* sp. n.**

TYPE MATERIAL. Holotype: Male labelled "Sud-Graccia Attica ostl. Athen 3.4.1989 lg. Paulus", coll. of the author. Paratypes: 1 female with the same label as the holotype, coll. of the author. Greece: Galaxidion, 4.1983, 1 female (at *Orchys papilionacea*), Voith lgt., coll. of the author.

***Anthocopa* (*Arctosmia*) *graeca ionica* ssp. n.**

TYPE MATERIAL. Holotype: Turkey, Ephessos, 18.5.1992, 1 female, lgt. et coll. Liebig. Paratypes: Greece, Rhodes, Kolybia, 22.4.1992, 1 female, Riemann lgt., coll. Ubersee-Museum Bremen. Turkey, Kusadasi, 8–16.5.1992, 1 female, lgt. et coll. Liebig. Assos, 12.5.1992, 1 female, lgt. Liebig, coll. of the author.

***Anthocopa* (*Arctosmia*) *brevispina* sp. n.**

TYPE MATERIAL. Holotype: Male, Turkey, Erzurum, 29.6.1973, lgt. et coll. Ozbek. Paratypes: Turkey, Ballikoy Yaylasi Rize, 2300 m, 5.8.1995, 1 female, E. Turab lgt., coll. Zanden. Caucasus, Teberda, 28.7–13.8.1976, 1 female, K. Bley lgt., coll. Zanden.

ADDITIONAL MATERIAL (due to the very poor condition not assigned as paratype): Teberda, 22.8.1955, 1 female, coll. v. d. Zanden.

The specific characters of these two species are tabulated and compared with *A. villosa* (Schenck, 1853) and *A. unispina* (Alfken, 1935).

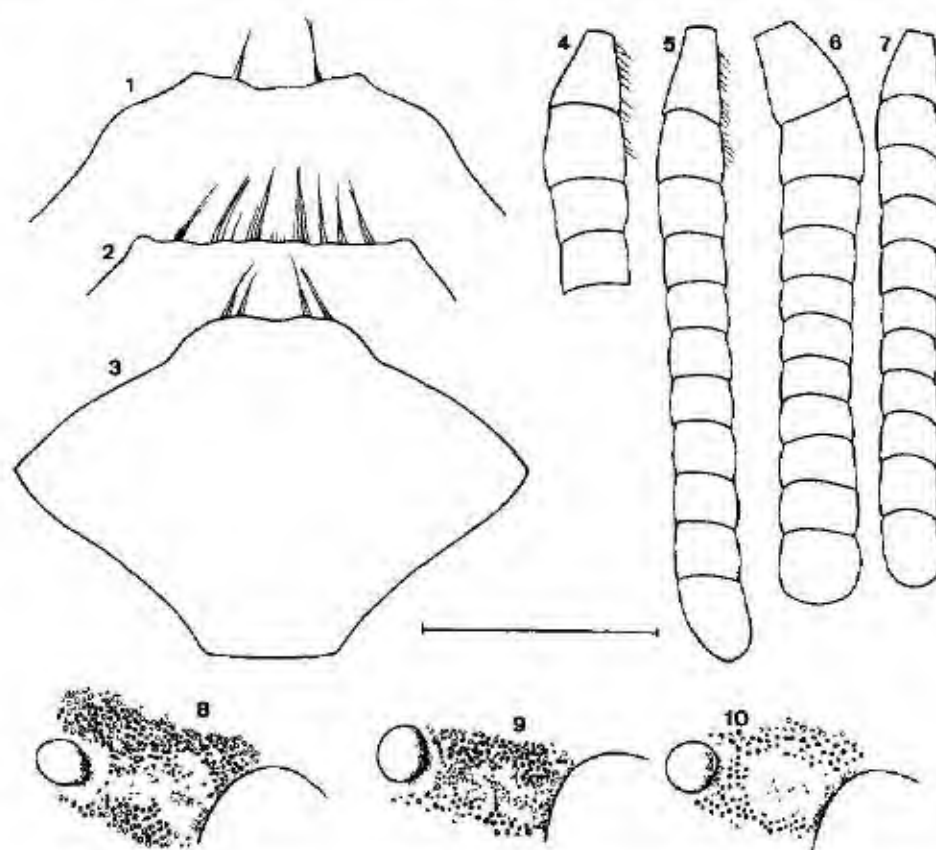
MATERIAL EXAMINED. *A. villosa*: Spain, Puerto de Bonagua, 2000 m, 22.7.1972, 1 female, Kingbyday, coll. v. d. Zanden. France, Baréges, 1 female ex coll. Perez in coll. Mus. Nat. Hist. Nat. Paris. Ht. Savoie, Chamonix, 21.8.1991, 1 female and Chamonix la Flégère, 1850 m, 1 female, both coll. Fonfria. Slovakia, Near Čadca,

7 1984, 1 female. lgt et coll Tkaleč Velfka Fatra, Sečenecká dolina, 3.9 1973, lgt et coll Valenčík *A. unispina* Lectotype (designated by v. d. Zondén and studied by the author in 1990) Male labelled as follows: 1) black printed and rimmed "Palästina 19-26 IV 34, Dr. Enslin" at back side of the same label written with Chinese ink "Nabius"; 2) red label "Allo-Typus" (not assigned as such by Alfken in original description); 3) "Osmia (male mark) unispina m. J. D. Alfken 1934"; 4) printed "Slg. Alfken"; 5) red label "Lectotype v.d. Za-1986"; 6) printed "Zool. Mus. Berlin". Condition very good, only two ultimate tarsal segments of the right mid leg are missing. Genitalia dissected and mounted separately by the author - Paralectotype (studied in 1990) Female labelled as follows: 1) as in lectotype; 2) red label "Typus" (no holotypus mentioned by Alfken in original description); 3) "Osmia (female mark) unispina m. det J. D. Alfken 1934"; 4) "Slg. Alfken"; 5) red label "Para-Lectotype v.d. Za 1986"; 6) "Zool. Mus. Berlin". Condition very good, only two ultimate tarsal segments of the right hind leg are missing.

<i>A. villosa</i> (Schneek)	<i>A. unispina</i> (Alfken)	<i>A. graeca</i> sp. n.	<i>A. brevispina</i> sp. n.
Females			
Supraorbital line crossing lateral ocelli ca. in their upper third, ocelluloocular distance = 640 μ m, ocellulooccipital distance = 610 μ m	Upper margin of lateral ocelli positioned slightly below supraorbital line, ocelluloocular distance = 720 μ m, ocellulooccipital distance = 865 μ m	Supraorbital line touching lateral ocelli at their upper margin, ocelluloocular distance = 770 μ m, ocellulooccipital distance = 960 μ m	Supraorbital line touching lateral ocelli at their upper margin, ocelluloocular distance = 720 μ m, ocellulooccipital distance = 720 μ m
Apical truncation of clypeus nearly straight, with an imperceptible shallow and narrow emargination. Punctuation of disk less coarse	Apical truncation of clypeus (Fig. 1) with a shallow but broad, wavy-shaped emargination medially, lateral corners angulate. Punctuation of disk coarser	Apical truncation of clypeus (Fig. 2) straight, lateral corners slightly projecting angularly. Punctuation of disk less coarse	Apical truncation of clypeus (Fig. 3) with a shallow and narrow emargination medially, lateral corners evenly rounded, lateral borders rather long. Punctuation of disk less coarse
Proximal abscissa of cubital cell 2 of fore wing a little longer than the distal one	Proximal abscissa of cubital cell 2 of fore wing ca. as long as the distal one	Proximal abscissa of cubital cell 2 of fore wing at least twice as long as the distal one	Proximal abscissa of cubital cell 2 of fore wing a little longer than the distal one
Body length 9.5-11 mm	Body length 11.0-11.5 mm	Body length 11.5-12 mm	Body length 11 mm
Tegulae dark brown, their outer portions having a brown-yellow tinge	Tegulae dark brown, their outer portions yellowish, semitranslucent	Tegulae totally blackish-brown	Tegulae totally blackish-brown
Tarsal segment 5 brownish-yellow, only basally darker brown	Tarsal segment 5 brownish-yellow, only basally darker brown	Tarsal segment 5 black, narrowly lightened with yellow-brown apically	Tarsal segment 5 (and mostly segments 3 and 4 too) brownish-yellow
Upper part of frons, as well as vertex and thoracic dorsum with vivid ochreous pubescence	Upper part of frons greyish-white, vertex and thoracic dorsum with pale greyish-yellow pubescence	Upper part of frons as well as vertex and thoracic dorsum with vivid ochreous pubescence	Head and thorax totally with vivid ochreous pubescence
Pubescence of tergites 1 and 2 long, erect, greyish-white, preapical borders lacking distinct hair bands	Pubescence of tergites 1 and 2 long, erect, greyish-white, preapical borders having broad bands consisting of thickset recumbent white hairs	Pubescence of tergites 1 and 2 long, erect, ochreous, preapical borders having (except for median part) bands consisting of semirecumbent greyish-white or whitish-yellow hairs	Pubescence of tergites 1 and 2 long, erect, ochreous, preapical borders lacking distinct hair bands

Pubescence of tergite 3 long, erect, blackish, on preapical border (except for median part) greyish white	Pubescence of tergite 3 shorter, erect, brownish, with a reddish tinge in some lights, preapical border having broad recumbent white hair band	Pubescence of tergite 3 long, erect, ochreous, preapical border having a recumbent greyish-white or yellowish hair band, being scantier and narrower medially	Pubescence of tergite 3 moderately long, erect, totally black (lacking any distinct hair band on preapical border)
Pubescence of tergite 4 rather long, erect, black, only on lateroapical portions greyish-white	Pubescence of tergite 4 shorter, erect, brownish with a reddish tinge, preapical border having a rather broad recumbent white hair band	Pubescence of tergite 4 long, erect, brownish, only laterally paler, preapical border having a recumbent white or whitish-yellow hair band	Pubescence of tergite 4 totally black (without any intermixed light hairs)
Pubescence of tergite 5 long, erect, black	Pubescence of tergite 5 short, erect, blackish-brown, preapical border having a rather broad recumbent white hair band	Pubescence of tergite 5 long, erect, black, preapical border having a recumbent white or whitish-yellow hair band	Pubescence of tergite 5 long, totally black (without any intermixed light hairs)
Pubescence of tergite 6 short, erect, black	Pubescence of tergite 6 very short, semi-erect, black	Pubescence of tergite 6 short, semi-erect, black	Pubescence of tergite 6 short, semi-erect, black
Scopa fox-red, on sternite 6 dark brown	Scopa ochreous, on tergites 5 and 6 dark brown	Colour of scopa variable either dark fox-red on sternites 2 and 3 and black on succeeding ones, or nearly totally black with a reddish tinge on sternite 2	Scopa totally black (without any intermixed light hairs)
Males			
Occiput in frontal view weakly arcuated	Occiput in frontal view more distinctly arcuated	Occiput in frontal view slightly more distinctly arcuated than in <i>A. villosa</i>	Occiput in frontal view evenly arcuated
Supraorbital line crossing lateral ocelli at their upper third, ocelloocular distance = 480 μ m, ocellooccipital distance = 385 μ m	Supraorbital line touching lateral ocelli at their upper margin, ocelloocular distance = 560 μ m, ocellooccipital distance = 720 μ m	Supraorbital line crossing lateral ocelli at their upper fourth, ocelloocular distance = 545 μ m, ocellooccipital distance = 640 μ m	Supraorbital line crossing lateral ocelli at their upper fourth, ocelloocular distance = 560 μ m, ocellooccipital distance = 610 μ m
Sculpture in ocelloocular area from sculpture of the adjacent vertex portions in all 4 species markedly different. Specific characters as follows. Punctuation distinctly finer and more crowded with interspaces edgily narrow. At outer margin of lateral ocellus a narrow impunctate and strongly shining area of ca. 2 puncture width.	Punctuation in ocelloocular area (Fig. 8) very fine (10–15 μ m) and crowded, with interspaces only edgily narrow, arranged in a transverse stripe of a half ocellus diameter. In ocular half a small shallow, transverse-ovate portion covered with fine dense punctuation. At outer margin of lateral ocellus an impunctate and strongly shining area of ca. half ocellus diameter.	Punctuation in ocelloocular area (Fig. 9) very fine (10–15 μ m), ill defined, shallow, dulled with chagreening of narrow interspaces, arranged in a transverse-ovate stripe of an ocellus diameter. The impunctate and strongly shining area at outer margin of lateral ocellus nearly as large as in <i>A. unispina</i> .	Punctuation in ocelloocular area (Fig. 10) very fine (10–20 μ m) with interspaces edgily narrow, arranged in a transverse, somewhat oblique stripe. This area is rimmed by a nearly bare strongly shining border bearing widely scattered very fine (10 μ m) punctures.

Antenna as in Fig. 7a in Zanden (1987: 79). Flagellar segment 2 on its hind face lacking short erect hairs. Flagellar segment 1 and 2 ca. equally long in frontal view. Penultimate segment wider than its length. Ultimate segment a little longer than its width.	Antenna as in Fig. 4, 5. Flagellar segment 2 on its hind face with short erect whitish velvety hairs. Flagellar segments 1 and 2 ca. equally long in frontal view. Penultimate segment squarish. Ultimate segment distinctly longer than its width.	Antenna as in Fig. 6. Flagellar segment 2 on its hind face lacking short erect hairs. Flagellar segment 1 a little longer than segment 2 in frontal view. Penultimate segment distinctly wider than its length. Ultimate segment squarish.	Antenna as Fig. 7. Flagellar segment 2 on its hind face lacking short erect hairs. Flagellar segment 1 distinctly longer than segment 2 in frontal view. Penultimate segment squarish. Ultimate segment distinctly longer than its width.
Uncus of protibia very short, imperceptible.	Uncus of protibia longer than in <i>A. villosa</i> .	Uncus of protibia slightly longer than in <i>A. villosa</i> .	Uncus of protibia longer than in <i>A. villosa</i> .



Figs 1-10. Figs 1-3 - apical truncation of female clypeus, 1 - *Anthocopa (Aretasma) unispina*, paralectotype, 2 - *A. graeca*, paratype, 3 - *A. brevispina*, paratype. Figs 4-7 - flagellar segments of males in frontal view, 4, 5 - *A. unispina*, lectotype (right), 4 - four proximal segments slightly from the inner side, as to show their maximal width, 6 - *A. graeca*, holotype (left), 7 - *A. brevispina*, holotype (right). Figs 8-10 - sculpture of ocellocular area of males, 8 - *A. unispina*, lectotype, 9 - *A. graeca*, holotype, 10 - *A. brevispina*, holotype. Scale = 1 mm.

Proximal abscissa of cubital cell 2 of fore wing a little longer than the distal one	Proximal abscissa of cubital cell 2 of fore wing shorter than the distal one	Proximal abscissa of cubital cell 2 of fore wing a little longer than the distal one	Proximal abscissa of cubital cell 2 of fore wing a little longer than the distal one
Cuticular midapical spine of sternite 3 long and slender (Fig. 16)	Cuticular midapical spine of sternite 3 long and slender	Cuticular midapical spine of sternite 3 long and slender (Fig. 17)	Cuticular midapical spine of sternite 3 short and wide, with sides meeting in angle of 60° (Fig. 18)
Genitalia as in Fig. 7c in Zanden (1987: 79)	Genitalia as in Figs 11, 12	Genitalia as in Fig. 13	Genitalia as in Fig. 14
Tarsal segments 2-4 dark brown, ochreous in apical portions, segment 5 brownish-yellow or only partially darkened	Tarsal segments 2-4 dark brown, partially lightened, segment 5 brownish-yellow	All tarsal segments uniformly blackish-brown	Tarsal segments 2-4 markedly brownish yellow (segment 2 eventually partially darkened)
Under part of thorax with greyish-white, vertex and thoracic dorsum with ochreous pubescence	Under part of thorax with greyish-white, vertex and thoracic dorsum with pale greyish-yellow pubescence	Under part of thorax with greyish-white, vertex and thoracic dorsum with pale greyish-white pubescence	Upper part of frons as well as vertex and thoracic dorsum and upper parts of mesepisternum totally covered with vivid ochreous pubescence
Pubescence of tergites 1 and 2 greyish-white	Pubescence of tergites 1 and 2 greyish-yellow	Pubescence of tergites 1 and 2 greyish-yellow	Pubescence of tergites 1 and 2 greyish-white
Pubescence of tergites 3-5 blackish, only laterally weakly intermixed with whitish hairs	Pubescence of tergites 3-5 dark brown with a reddish tinge, preapical borders having whitish fasciae, broadly interrupted medially	Pubescence of tergites 3-5 dark brown with a reddish tinge, preapical borders having whitish fasciae, broadly interrupted medially (fasciae of tergite 5 less conspicuous)	Pubescence of tergites 3-5 totally black (without intermixed light hairs)
Pubescence of tergite 6 dark brown, on lateral portions brownish fox-red	Pubescence of tergite 6 dark brown, on lateral portions reddish-yellow, tending to white in some lights	Pubescence of tergite 6 dark brown, on lateral portions dark fox-red	Pubescence of tergite 6 black, on lateral portions brownish fox-red
Pubescence of tergite 7 dark brown, on apical margin fox-red	Pubescence of tergite 7 fox-red	Pubescence of tergite 7 dark brown, tending to fox-red in some lights	Pubescence of tergite 7 totally black
Body length ca. 11 mm	Body length ca. 10.5-12.5 mm	Body length ca. 11 mm	Body length ca. 11 mm

Anthocopa (Arctosmia) graeca ionica ssp. n., female. Light pubescence ranging in the nominate subspecies from whitish-yellow on the tergites to vivid ochreous on head and thorax appears to be uniformly greyish-white all over these sclerites in ssp. *ionica*.

***Hoplosmia (Odontanthocopa) larochei* (Tkalců, 1993), new male**

<i>H. scutellaris</i> (Morawitz)	<i>H. larochei</i> (Tkalců)
Males	
Shape of labrum and occiput as in female	Shape of labrum (Fig. 26) and occiput as in female
Flagellar segment 1 a little longer than broad (cf. Fig. 33 in Tkalců 1974a: 116)	Flagellar segment 1 (Fig. 25) as long as broad
Punctuation of mesepisternum more crowded and coarser, tending to be penta- to hexagonal, interspaces rather narrow to edgely narrow, only in some places to half puncture width	Punctuation of mesepisternum more widespread and relatively finer, round, often spaced by more than one puncture width
Punctuation of sublateral zones along propodeal triangle more crowded, interspaces dulled by micro-sculpture	Punctuation of sublateral zones along propodeal triangle less crowded, interspaces brightly shining

MATERIAL EXAMINED *H. larochei*: Canary Islands, Gran Canaria, Arifles 3 km NW San Mateo, 31.3.1987, 2 males, A. C. & W. N. Ellis & A. M. & R. T. Simon Thomas lgt., loaned for examination by G. van der Zanden

ADDITIONAL NOTE. After having sent my manuscript on the bees of the Canary Islands (Tkalců, 1993) for printing the supraspecific names of these two species (as well as of other ones within the tribes Anthidini and Osmiini) assigned originally by me have been altered by the editor without my knowledge. So that only two conventional genera, i. e. *Anthidium* Fabricius and *Osmia* Panzer have been recognized. The taxa in question are the following:

Pseudanthidium canariense (Mavromoustakos)
Pseudanthidium italicum (Panzer)
Hoplosmia (Odontanthocopa) larochei (Tkalců)
Hoplosmia (Odontanthocopa) scutellaris (Morawitz)
Hoplitis (Alcedansea) aculeicornis brunneipes (Peters)
Hoplitis (Microhoplitis) holmanni (Tkalců) which is synonymous to *Osmia zandeni* Teunissen and Achterberg, 1992

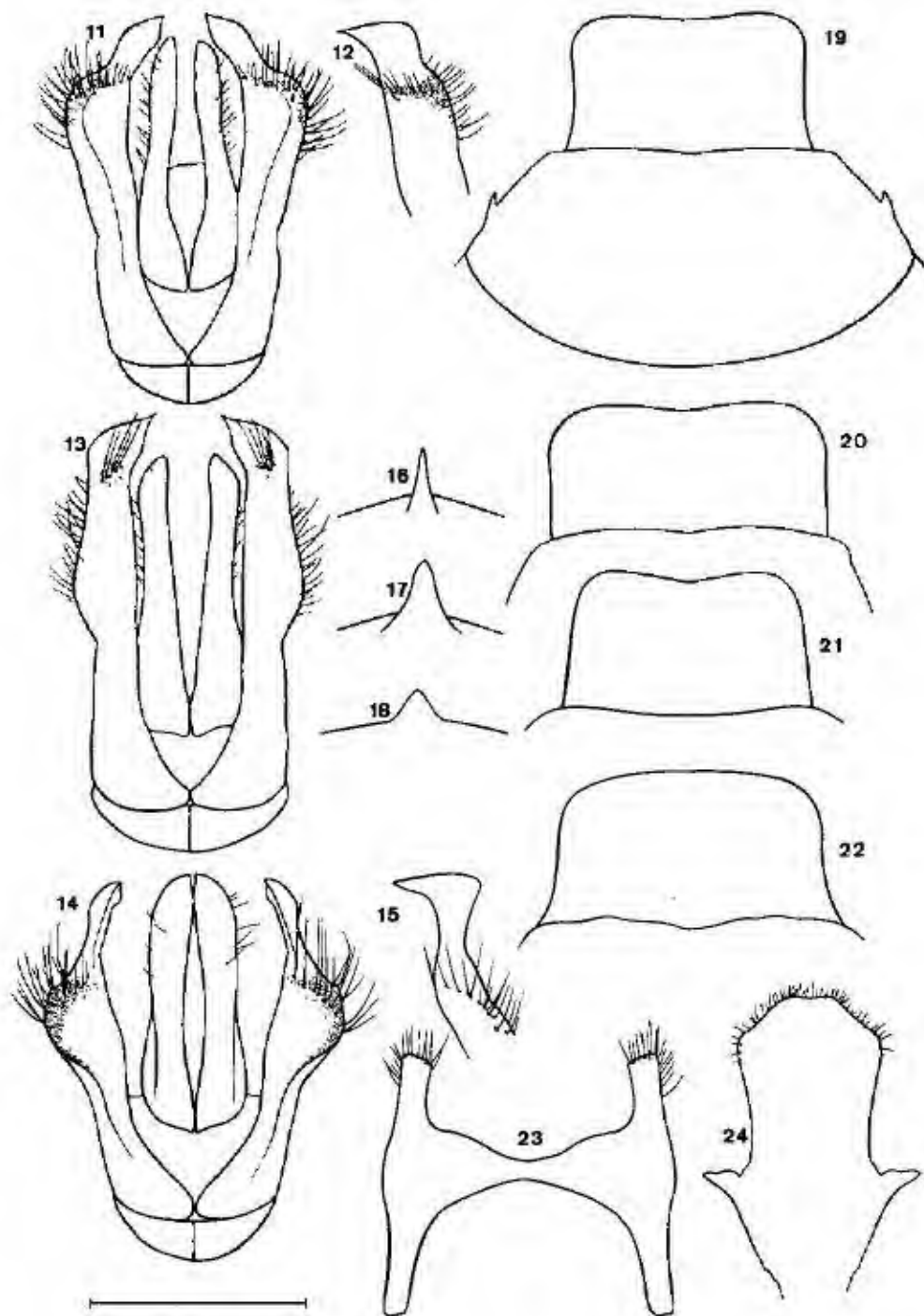
***Hoplitis (Micreriades) haemi* sp. n.**

TYPE MATERIAL. Holotype: Male "Bulgaria or Stara Planina (Si. brjag) 30 V 1987 Tkalců lgt." and at back side of the same label in Chinese ink "Košanica" coll. of the author. Paratypes: 3 males detto, one of them in coll. v. d. Zanden - Greece, Ioannina Site 2 km s. Asfaka, 600 m, 6-7.6.1988, 1 male, Tiefenthaler lgt., coll. v. d. Zanden. All 4 specimens from Bulgaria are absolutely fresh.

The specific name refers to Haemus, i. e. an ancient name of the Balkans, called Stara Planina in Bulgarian language. The village Košanica is situated below the southern slopes ca. 6 km far from the Black Sea coast. The place where the type-series was originally found is a sloping glade ca. 1 km N of Košanica, the dominant tree species is here *Carpinus orientalis* Mill. interspersed with *Pinus nigra* Arnold.

→

Figs. 31-24: Figs. 11-15 - Genitalia of males, 11 - *A. unispina* in dorsal view, lectotype, 12 - left gonostypus of *A. unispina* in dorsolateral view and slightly from behind, 13 - *A. graeca* in dorsal view, holotype, 14 - *A. brevispina* in dorsal view, holotype, 15 - left gonostypus of *A. brevispina* in dorsal view, holotype, 15 - left gonostypus of *A. brevispina* in dorsolateral view. Figs. 16-18 - Spine-like projection of apical margin of sternite 3 of males: 16 - *A. villosa*, 17 - *A. graeca*, holotype, 18 - *A. brevispina*, holotype. Figs. 19-22 - tergites 6 and 7 of males in dorsal view: 19 - *A. villosa*, 20 - *A. unispina*, lectotype, 21 - *A. graeca*, holotype, 22 - *A. brevispina*, holotype. Figs. 23-24 - sternites 7 and 8 of *A. brevispina*, holotype. Scale = 1mm.



***Hoplitis (Micreriades) antalyae* sp. n.**

TYPE MATERIAL. Holotype: Male "Antalya Boldibi, 23.4.55.88 H. Wolf", coll. v. d. Zanden. Paratype: Antalya, 14.5.1996, 1 male, Berg. lgt., coll. Zanden.

***Hoplitis (Micreriades) pisidia* sp. n.**

TYPE MATERIAL. Holotype: Male "Türkiye Ege'dir u. Umgeb. 15-25.5.1988 leg. N. Mohr", coll. v. d. Zanden.

The specific name refers to Pisidia, i.e. the terra typica. All these three species appear nearly conform regarding their morphology, pubescence pattern and general appearance. The long recumbent white or whitish yellow pubescence of the clypeus, supraclypeal area, frons, totally concealing the integument, intermixed with longer erect setae on frons, and the pubescence of the thorax and legs are very similar; indeed. Tibial spurs appear to be uniformly pale yellow. Nevertheless the genital capsule of each species bears minute but distinct specific features.

<i>H. haemi</i> sp. n.	<i>H. antalyae</i> sp. n.	<i>H. pisidia</i> sp. n.
Length-width ratio of head in frontal view = 133/112	Length-width ratio of head in frontal view = 95/89	Length-width ratio of head in frontal view = 125/112
Scapus wider (Fig. 33)	Scapus slender (Fig. 34)	Scapus slender
Punctuation of mesoscutum a trifle more crowded, interspaces mostly edgily narrow, only in some places to one half of a puncture width	Punctuation of mesoscutum less crowded, interspaces only in some places edgily narrow, mostly of one half of a puncture width, here and there to one puncture width	Punctuation of mesoscutum a trifle more crowded, interspaces mostly edgily narrow, only in some places one half of a puncture width
Punctuation of sternite 2 more even, denser and coarser	Punctuation of sternite 2 finer and distinctly more widespaced	Punctuation of sternite 2 more even, denser and coarser
Nervulus of fore wing weakly antefurcal, oblique. Cubital cell 1 of fore wing as large as (or a trifle longer than) cubital cell 2. Proximal abscissa of cubital cell 2 a little longer than the distal one	Nervulus of fore wing nearly interstitial, oblique. Cubital cell 1 of fore wing markedly longer than cubital cell 2. No proximal abscissa of cubital cell 2 in holotype, in paratype proximal abscissa a trifle longer than the distal one	Nervulus of fore wing antefurcal, oblique. Cubital cell 1 of fore wing markedly longer than cubital cell 2. Proximal abscissa of cubital cell 2 imperceptibly longer than the distal one
Genitalia as in Fig. 48	Genitalia as in Fig. 49	Genitalia as in Fig. 50
Tegulae brownish-yellow	Tegulae darker	Tegulae brownish-yellow
Segment 5 of tarsi totally brownish-yellow (segment 4 mostly less dark than the preceding ones)	Segment 5 of tarsi basally dark, toward apex gradually lightened with brownish-yellow	Segment 5 of tarsi dark brown, at apex brownish-yellow
Preapical margins of tergites 1-5 broadly lightened with yellow-brown	Preapical margins of tergites 1-5 only very narrowly and imperceptibly bordered with yellow-brown	Preapical margin of tergites 1-5 narrowly lightened with yellow-brown
Uncus of protibia blackish	Uncus of protibia yellow-brown	Uncus of protibia black
Tergites 1-4 bordered with dense fasciae, those of tergites 1 and 2 broader, broadly interrupted medially, fascia of tergite 3 entire, narrower and scantier medially, that of tergite 4 very narrow	(Holotype and paratypes rather worn. Nevertheless, the rests of pubescence gave an impression that the tergites 1-4 are normally provided with similar hair bands as in <i>H. haemi</i> .)	(Holotype worn. Pubescence nearly rubbed off. Rests of white hair bands merely on antelateral portions of tergite 1 present.)

Full median third of apical margin of sternite 3 with long whitish fascia.	Only a narrow median zone of apical margin of sternite 3 with whitish fascia	Full median third of apical margin of sternite 3 with long whitish fascia
Body length ca. 5.5 mm (abdomen curved inside). Length of fore wing 4.5 mm	Body length ca. 5 mm. Length of fore wing 3.5 mm	Body length ca. 6 mm. Length of fore wing 4.5 mm

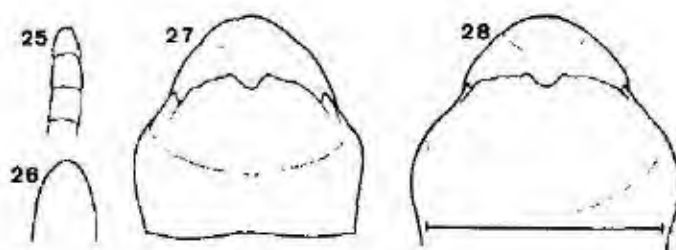
There is almost a complete agreement in general appearance among the species of this subgenus. The other intimately allied *Micreranodes*-species known as yet differ from the ones described presently as follows:

H. lebanotica (Mavromoustakis, 1955) in having "large slanting tubercle" of sternite 1; *H. parnassica* (Mavromoustakis, 1958) in having the clypeus longer, the metabasitarsi a little longer and slender and in having a distinctly widened gonostylus (Fig. 52); *H. illyrica* (Noskiewicz, 1926) in having the marginal cell of fore wing distinctly shorter (as in Fig. 11 in Tkalcu 1974b: 326); *H. tenuispina* (Alfken, 1937) in its differently shaped antennae (Figs. 5 and 6 in Tkalcu 1977: 90) and in having the sides of apical margin of sternite 7 evenly rounded (Figs 9, 10 and 11 in Tkalcu 1977: 91). Lastly, the following three remaining species are more remotely allied, i. e. *H. nasuta* (Friese, 1899) (type material and additional notes to the original description in v. d. Zanden, 1989: 81, Fig. 8 on page 82); *H. pungens* (Benoist, 1928) (redescription and Figs. 3, 7, 8, 12, 13, 14, 16 and 18 in Tkalcu 1977); *H. corniculata* v. d. Zanden, 1989, each of them can hardly be mistaken for any other species of this subgenus.

Hoplitis (Liosmia) ozbeki sp. n.

TYPE MATERIAL. Holotype: Male. Turkey "Erzurum Serceme 23/VII/1978 H. Ozbek", coll. Ozbek (A nearly fresh specimen in good condition). Paratype: Female. Caucasus Dombai Alibek ca. 2600 m, 20.7.1975, H. H. Dalich let., coll. of the author (A fresh specimen in very good condition, only both antennae missing).

FEMALE. Morphology: Head in frontal view as long as broad. Inner orbits slightly incurved in their upper third, their lower portions feebly converging below. Mandibles tridentate. Mouth parts moderately long, maxillary palpi rather long, 5-segmented (Fig. 54), segment 1 of labial palpi nearly as long as segment 2. Upper margin of lateral ocelli touching supraorbital line. Ocelloocular distance = 480 μ m, ocellooccipital distance = 450 μ m, diameter of lateral ocellus = 160 μ m. Clypeus as in Fig. 53; punctation very crowded (20–35 μ m), punctures separated by very narrow interspaces imperceptibly dulled with microsculpture except for impunctate, irregularly delimited shining me-



Figs 25–28 *Hoplosmia (Odontanthocopa) larochei*, male, 25 – three proximal flagellar segments of left antenna, 26 – labrum, 27, 28 – tergites 6 and 7. Scale = 1 mm.

diobasal portion and for feebly impressed, impunctate and strongly shining zone along incision of midapical clypeal margin. Sculpturing of supraclypeal area crowded, punctures distinctly finer than on clypeus, round, eventually tending to be penta- to hexagonal (15–30 μm), interspaces very narrow, in some places to half puncture width, except for small midapical area sparsely punctate. Punctuation of frons similar to that of clypeus. Punctuation of vertex round, sharply delimited (20–35 μm), interspaces to one puncture width, strongly shining with some irregularly scattered very fine punctures, outer margins of lateral ocelli each with an impunctate portion equal to half ocellus width, beyond median ocellus on supraorbital line an impunctate, irregularly delimited area of ca. ocellus diameter. Punctuation of tempora and genal area similar to that of frons. Sculpturing of mesoscutum and scutellum dense, punctures round (30–40 μm), interspaces a half to one puncture width, strongly shining, with few minute punctures in some places, punctuation of median portion behind median longitudinal stria widespread. Punctuation of mesepisterna similar in size and density to that of mesoscutum, on lower parts less crowded. Tegulae polished and nearly bare, with only a few irregularly scattered minute punctures for the most part, only anteriorly rather densely punctate. Propodeal triangle chagreened throughout, dulled basally but rather shining below. Adjacent portions of propodeum covered with somewhat ill defined punctures of irregular size (10–25 μm), spaced by roughened ground by ca. one puncture width. Uncus of fore tibia strongly developed (Fig. 56). Strigilis as in Fig. 58. Legs normally shaped. Hind coxae without ventral longitudinal carina. Hind basitarsi nearly parallel sided in outer view. Tergite 1 without gradulus, its ventrolateral portion without stria. Tergites mostly shining, their punctuation finer in middle portion and becoming coarser laterally, interspaces irregular.

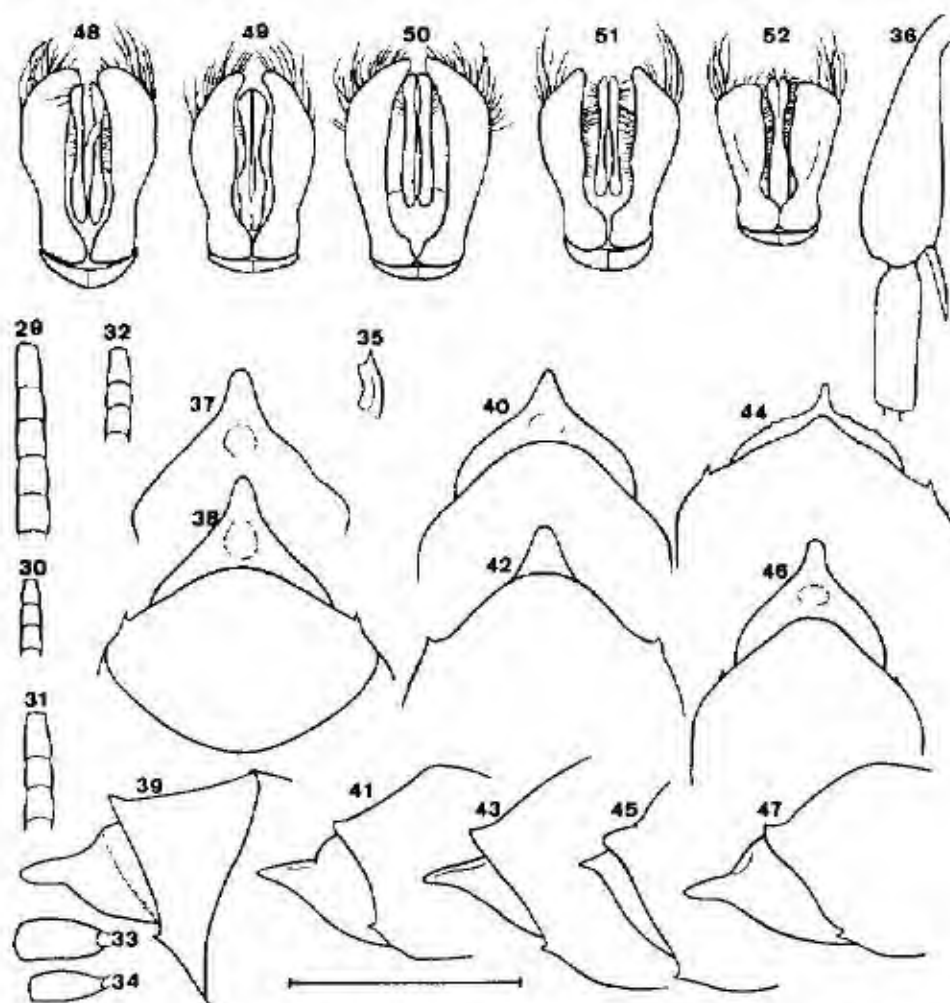
Body length ca. 8 mm, length of fore wing 6 mm.

Integument. Black. Meso- and metafemora, all tibiae (inclusive tibial spurs) and tarsi markedly yellow-brown (only ventrobasal parts of mesofemora blackish), uncus of pro- and mesotibiae, pulvilli and apical halves of claws dark brown. Tegulae dark brown. Fore wing membrane nearly hyaline, apical border feebly infumated with greyish-brown. Venation dark brown. Nervulus interstitial, cubital cell 1 distinctly larger than the 2 one. Proximal abscissa of cubital cell 2 as long as the distal one.

Pubescence. Moderately long, loose, erect or nearly so, nowhere completely concealing the surface except for tergal apical hair bands, whitish in general. Two bilateral tufts of honey yellow bristles arising under midapical clypeal incision converging in right angle. Inner surfaces of basitarsi with pale ochreous pubescence. Apical margins of tergites 1–4 with dense appressed pure white hairs bands of moderate width, broadly interrupted in middle of tergites 1 and 2, less broadly so on tergite 3 and apparently not interrupted on tergite 4. Scopa hairs rather long, loose, semierect, their pale coloration having a faint yellowish tint with white reflections in some lights.

Male. Morphology. Head in frontal view as long as broad. Mandibles bidentate. Labrum ca. quadrate, bare and strongly shining for the most part, only along apical margin dulled and covered with minute and ill defined punctures. Mouth parts as in female. Upper margins of lateral ocelli situated slightly below supraorbital line. Ocelloocular distance = 290 μm , ocellooccipital distance = 320 μm , diameter of lateral ocellus = 160 μm . Clypeus with an impunctate strongly shining zone along its anterior straight margin. Sculpturing of frontovertex, tempora and genal area similar to that of female. Proximal segments of flagellum as in Fig. 55, flagellum progressively slightly widened in its proximal half, in distal half parallel sided in frontal view, segments 4–11 squarish in frontal view, ultimate segment slightly longer than its maximal width. Sculpturing of thorax similar to that of female. Propodeal triangle dulled basally but strongly shining along its sides. Uncus of fore tibia well developed (Fig. 57). Strigilis as in Fig. 59. Legs normally shaped. Hind coxae without ventral longitudinal carina, posteriorly elevated and produced into a short obtuse median tooth. Tergite 1

without gradulus, its ventrolateral portion without stria. Tergites shining with punctation finer and more regularly arranged than in female. Shape of tergites 6 and 7 as in Figs 62–64. Apical margin of sternite 1 straight. Sternite 2 bearing a large biconvex transverse tubercle (Figs 60, 61) occupying nearly its full width, with ca. rectangular sides and broadly rounded top as seen from behind,



Figs 29–52. Males of some species of *Hoplitia* subgen *Micreriadex*. Figs 29–32 – proximal flagellar segments of right antenna, 29 – *H. haemi*, holotype, 30 – *H. antalyae*, holotype, 31 – *H. pusidae*, holotype, 32 – *H. parnassica*. Figs 33, 34. Scapus, 33 – *H. haemi*, 34 – *H. antalyae*, holotype. Figs 35–39. *H. haemi*, holotype, 35 – strigilis, 36 – right hind tibia and basitarsus, 37 – tergite 7 in dorsal view, 38 – tergites 6 and 7 in dorsal view, paratype, 39 – same in lateral view. Figs 40, 41. *H. antalyae*, holotype, 40 – tergites 6 and 7 in dorsal view, 41 – same in lateral view. Figs 42, 43. *H. pusidae*, holotype, 42 – tergites 6 and 7 in dorsal view, 43 – same in lateral view. Figs 44, 45. *H. lebanonica*, 44 – tergites 6 and 7 in dorsal view, 45 – same in lateral view. Figs 46, 47. *H. parnassica*, 46 – tergites 6 and 7 in dorsal view, 47 – same in lateral view. Figs 48–52. Genitalia in dorsal view, 48 – *H. haemi*, holotype, 49 – *H. antalyae*, holotype, 50 – *H. pusidae*, holotype, 51 – *H. lebanonica*, 52 – *H. parnassica*. Scale = 1 mm.

surface strongly shining for the most part and irregularly covered with small, widely scattered punctures, more richly so on front surface. Apical margin of sternite 2 produced into broadly rounded translucent membrane. Sternite 3 with bilateral transverse and nearly impunctate subapical elevations, its apical margin narrowly incised in middle. Sternite 4 rounded only at sides, bearing a very broad, nearly semicircular emargination in middle. Sternite 5 similar but its emargination shallower. Sternite 6 as in Fig. 65. Genitalia as in Fig. 66.

Body length ca. 8 mm; length of fore wing 5 mm.

Integument: Black. Flagellar segments 1-3 dark brown, the remaining ones toward apex gradually dull yellowish brown, ultimate segment diffusely darkened in terminal part. Profemora and prothibiae blackish-brown, inside and outside surfaces of ventral parts and a small dorsoapical part of prothibiae yellowish-brown; protarsi, femora, tibiae (inclusive tibial spurs) and tarsi of mid and hind legs markedly yellow-brown (only mesofemora darkened ventrobasally). Uncus of pro- and mesothorax and pulvilli dark brown, apical halves of claws reddish-brown. Tegulae brownish-black, lateroposterior portions but yellowish-brown, semitranslucent. Fore wing membrane nearly hyaline, venation as in female. Tergites chestnut-brown, tending to be paler toward metasoma apex. Sternites chestnut-brown.

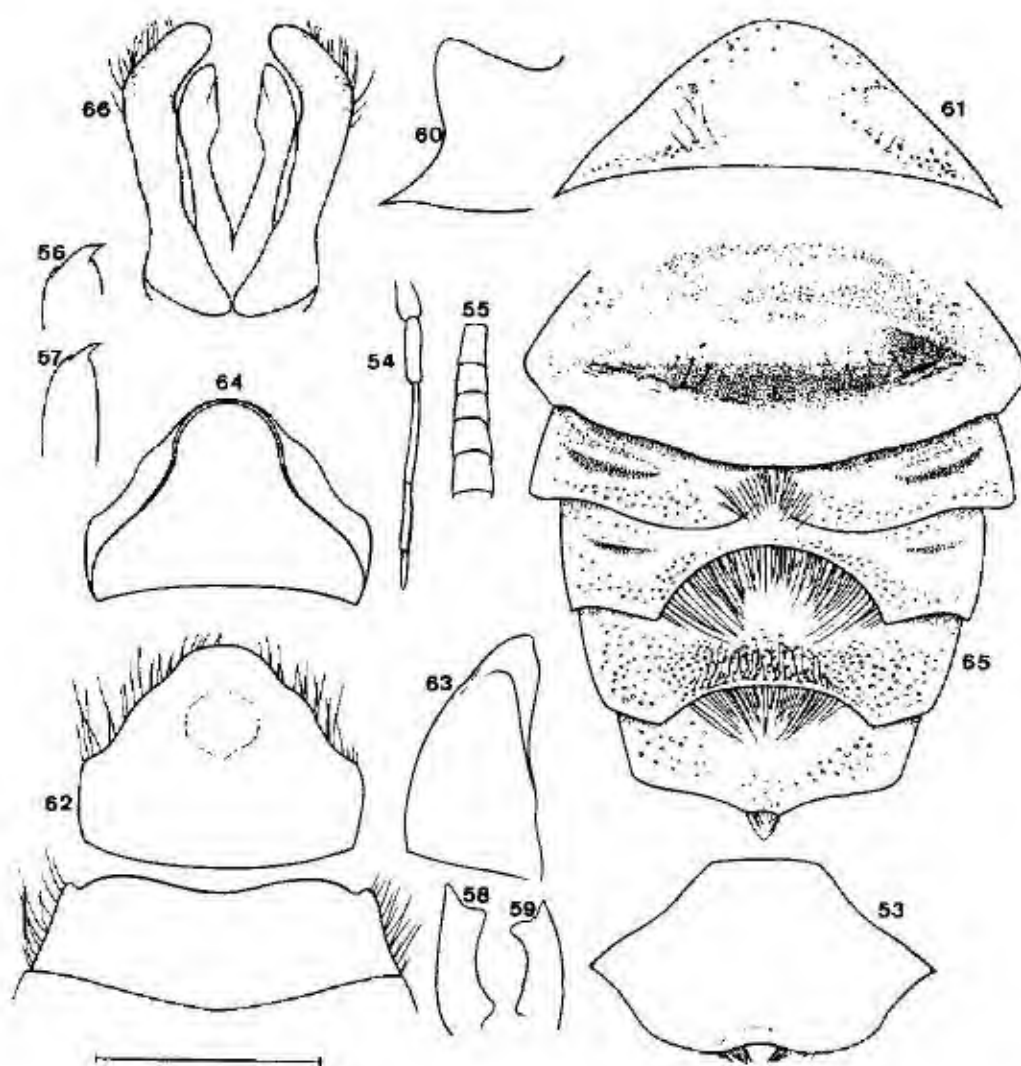
Pubescence: Moderately long, loose, erect or nearly so, and nowhere completely concealing the surface except for tergal apical hair bands and for perhaps pubescence of clypeus and adjacent portions of head where the hair is completely glued together and dirty; coloration pale to vivid ochreous in generally. Short bristles arising under clypeal margin honey yellow. Hairs of dorsal surfaces of tibiae very short. Apical margin of tergites 1-5 with rather narrow appressed creamy white hair bands broadly and diffusely interrupted in middle of tergites 1 and 2, less broadly so on tergite 3 and much less on tergites 4 and 5; light hair bands replaced on middle portions of tergal margins by a row of thinner greyish and inconspicuous hairs. Short hairs of all these tergal bands ending distinctly before tergal margins which appear as narrow impunctate shiny lines. Long bristles of midapical emargination of sternites 3-5 as in Fig. 65. Along apical margin of sternite 5 a row of soft erect bristles.

Hoplitis (Liosmia) mollis sp. n.

TYPE MATERIAL: Holotype: Male from Turkey labelled "Erzurum 26/VI/1976 H. Ozbek"; coll. of the author. Paratypes: Datto, 4.6.1970, 1 male, 9.6.1970, 1 male, 12.6.1970, 1 female, 15.6.1970, 1 female coll. of the author; 17.6.1970, 1 male, 26.6.1970, 1 female, 2.7.1970, 1 male coll. of the author; 6.7.1971, 1 female, 2.7.1972, 1 male, 8.7.1972, 1 male, 8.7.1972, 1 male coll. of the author; 20.6.1974, 1 female, 23.6.1974, 1 female, 26.6.1974, 1 female, 26.6.1976, 1 male coll. of the author; 5.7.1990, 1 female Bayburt, 20.6.1976, 1 female coll. of the author; if not otherwise indicated, all paratypes lgt. et coll. Ozbek Bulgaria mer-occ., Ploski near Sandanski, 18.6.1990, 1 female, B. et O. Tkalcu lgt.; coll. of the author.

Though from *H. curtula* (Pérez, 1895) = *H. bofilli* (Pérez, 1905) from south western Europe separated by a wide geographical gap the new species is closely allied to it. Both may be separated from each other as follows:

<i>H. curtula</i> (Pér.)	<i>H. mollis</i> sp. n.
Females	
Punctuation of supraclypeal area regular, more crowded and a trifle finer, with interspaces rather to edgily narrow	Punctuation of supraclypeal area somewhat irregular and a trifle coarser, with interspaces to one puncture width in some places
Hind tibia a little wider in outer view, punctuation on outer surface along anterior margin denser, spaced by one puncture width or a little more	Hind tibia a little narrower in outer view (Fig. 70); punctuation on outer surface along anterior margin wide-spread, spaced by several puncture width in some places



Figs 53-66. *Hoplitis (Lioxma) uzbeki*, male holotype and female paratype; 53 - female clypeus, 54 - palpus maxillaris, female, 55 - proximal flagellar segments of right antenna, male, 56 - apex of right fore tibia in dorsal view, female, 57 - same, male, 58 - strigilis, female, 59 - same, male, 60 - tubercle of male sternite 2 in lateral view, 61 - same as seen from behind, 62 - male tergites 6 and 7 in dorsal view, 63 - configuration of these tergites in normal position in lateral view, 64 - same in ventral view, 65 - male sternites 2-6, 66 - male genitalia in dorsal view. Scale: Figs 54, 58, 59 - 0.5 mm, others = 1 mm.

Flagelli dark brown, inner surfaces with a dull yellowish-brown tinge	Flagelli markedly lightened with ochreous
Body length 6.5 mm	Body length 6.5 mm
Males	
Tergite 7 in dorsal view as in Fig. 76 in Zanden (1989: 77)	Tergite 7 in dorsal view as in Figs 77, 78
Transverse bump of sternite 2 seen from behind as in Fig. 73	Transverse bump of sternite 2 seen from behind as in Fig. 75
Same in lateral view as in Fig. 74	Same in lateral view as in Fig. 76
Rather broad posterior zone of sternite 2 (between transverse bump and apical sternal margin) nearly completely bare, at most with single irregularly scattered punctures, strongly shining	Rather broad posterior zone of sternite 2 (between transverse bump and apical sternal margin) rather regularly punctured (at most with a small midapical portion unpunctate or nearly so)
Transverse bilateral tumescences of sternite 3 more elevated, with only scattered punctation on anterior surfaces	Transverse bilateral tumescences of sternite 3 lower, rather regularly punctured
Genitalia as in Fig. 7a in Zanden (1989: 77)	Genitalia as in Fig. 80
Body length 6 mm	Body length 6 mm

NOTE. "*Hoplitis mollis* Tkalec" cited by Özbek (1979: 101) is *nomen nudum*.

The material examined and figured assigned by Warncke (1991b) to *Osmia curtula* Pérez refer to *Hoplitis mollis* sp. n.

Hoplitis (Annosmia) kaszabi sp. n.

TYPE MATERIAL. Holotype: Male, labelled 1) "Mongolia Central aimak Ulan-Baator, Nacht im Bogdo ul, 1880 m (Exp. Dr. Kaszab, 1966)", 2) "Nr. 507 9 VI. 1966", coll. Hungarian Natural History Museum Budapest. Paratypes: 1 male "Mongolia, Bogdool a. Ulan Bator 1400-2000 m, 2.-12.7. 1988 Ochilke leg." 1 female "Mongolia scptr, Zentral-Aimak Ulan bator Bog Duul 11.07.1983 leg. Karl Bleyl" 1 female "MVR, Uvs-Aimag Kurort 30 km w. Ulanigon, Bergwiese 26.07.89 leg. Seidelmann" (Paratypes sent to the author by Mr G. van der Zanden on loan)

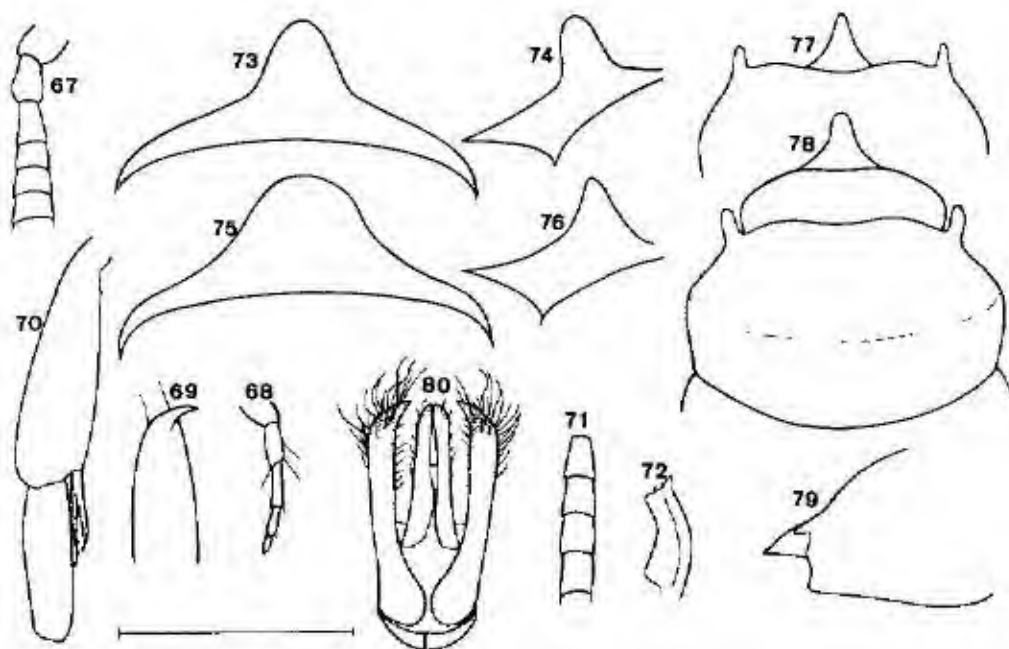
FEMALE. Morphology: Inner orbits in their upper 2/5 parallel, in their lower 3/5 slightly diverging below. Mandibles tridentate (Fig. 82). Mouth parts rather long. Maxillary palpi 5-segmented (Fig. 84). Segment 2 of labial palpi nearly twice as long as segment 1. Upper margin of lateral ocellus touching supraorbital line. Ocelloocular distance = 640 µm, ocellooccipital distance = 560 µm, diameter of lateral ocellus = 240 µm. Clypeus rather short, its length-width ratio 1:2, surface feebly convex with dense round punctures (30 µm), interspaces narrow to a half puncture width, polished. Anterior clypeal margin straight and irregularly denticulate (as is commonly so in females of *Hoplitis* s. str.). Lateral membranous, ca. triangular, yellowish coloured processes underneath clypeal margin well developed. Punctuation of supraclypeal area similar to that of clypeus. Punctuation of frontovertex also similar, slightly irregular, in a transverse stripe between lateral ocellus and ocular margin slightly finer and more crowded, with very narrow interspaces. Proximal segments of flagellum as in Fig. 81. Punctuation of mesoscutum rather dense, round, sharply delimited (30 µm or a little coarser), interspaces narrow to a half puncture width, polished, at inner margins of parapsidal lines edgily narrow. Scutellum with punctuation more crowded than mesoscutum, with a narrow unpunctate longitudinal line medially. Tegulae polished, fore hairy portion densely punctate, hind part with only a few irregularly scattered fine punctures. Propodeum triangle evenly chagreened. Adjacent portions of propodeum with fine (mostly under 30 µm) round punctures, interspaces irregular,

edgily narrow to more than one puncture width, chagreened throughout. Uncus of fore tibia as in Fig. 87. Strigilis as in Fig. 85. Hind coxae lacking ventral longitudinal carina. Hind tibial spurs straight, apically slightly curved inside and sharply pointed. Hind basitarsi parallel-sided. Tergite 1 without gradulus, only medially with feeble suggestion of such. Ventrolateral portions of tergite 1 each having a fine long stria. Dorsal surfaces of tergites 1-4 evenly and finely punctured (15-20 μ m), with interspaces more than one puncture width. Punctuation of tergites 5-6 a trifle coarser, more crowded and more sharply delimited, interspaces markedly narrower, shining.

Body length ca. 11 mm, length of fore wing 7 mm.

Integument: Black. Upper portions of ca. apical halves of flagelli dark reddish-brown. Tegulae black-brown. Tibial spurs ochreous. Mid basitarsi brown. Tarsal segments 2-5 of fore and mid legs and all tarsal segments of hind legs markedly yellowish-brown. - Fore wing membrane hyaline, venation blackish brown, only costal margin reddish at base. Nervulus interstitial. Proximal abscissa of cubital cell 2 of fore wing nearly twice as long as the distal one.

Pubescence. Rather long and uneven in general, erect on most body surface, light ochreous on frontovertex and thoracic dorsum, greyish on remaining sclerites. Inner surface of all tarsi golden-yellow. Pubescence of tergite 6 very dense, mostly appressed. Scopa hairs on sternites 2-5 golden-yellow, on sternite 6 pale greyish.



Figs 67-80 Figs 67-72 - *Haplus (Liosmia) molis*, 67 - proximal flagellar segments of right antenna, female, 68 - palpus maxillaris, female, 69 - apex of right fore tibia in dorsal view, female, 70 - right hind tibia and basitarsus, female, 71 - proximal flagellar segments of right antenna, male, 72 - strigilis, male. Figs 73, 74 - *Haplus (Liosmia) curtula*, male, 73 - tubercle of sternite 2 as seen from behind, 74 - same in lateral view. Figs 75-80 *Haplus molis*, male, 75 - tubercle of sternite 2 as seen from behind, 76 - same in lateral view, 77, 78 - tergites 6 and 7 in dorsal view, 79 - same in lateral view, 80 - genitalia in dorsal view. Scale: Figs 68, 72 = 0.5 mm, others = 1 mm.

MALE Morphology Inner orbits in their lower 3/4 diverging below. Mandibles as in Fig. 83. Labrum (Fig. 89) longer than its basal width, parallelsided except for strongly converging margins at base, its apical margin straight. Mouth parts as in female. Upper margin of lateral ocelli touching supraorbital line. Ocelloocular distance = 640 μ m, ocellooccipital distance = 720 μ m, diameter of lateral ocellus = 190 μ m. Shape of clypeus similar to that of female, surface evenly covered with small (15 μ m) penta- to hexagonal, very crowded punctures with interspaces edgily narrow (sculpture in fresh specimens hardly visible, as covered with dense long pubescence throughout), anterior margin nearly straight, lateral membranous pale yellow processes well developed. Punctuation of supra-clypeal area similar to that of clypeus. Punctuation of frontovertex in general as in female. Flagellum as in Fig. 90. Punctuation of mesoscutum and scutellum similar to the female (on inner sides of parapsidal lines not crowded). Tegulae similar to the female. Propodeal triangle chagreened, a broad margin along lateral sutures imperceptibly so. Uncus of fore tibia as in Fig. 88. Strigilis as in Fig. 86. Tegulae, hind coxae and hind tibial spurs as in female. Hind basitarsi parallelsided except for basal portions slightly convex. Tergite 1 without gradulus, its basal declivous portion with very fine, sparsely scattered punctures and a median longitudinal sulcus. Punctuation of all tergites sparser than in female. Apical margins of tergites 6 and 7 as in Figs 92, 93. Sternites as in Fig. 94. Genitalia as in Figs 95–97.

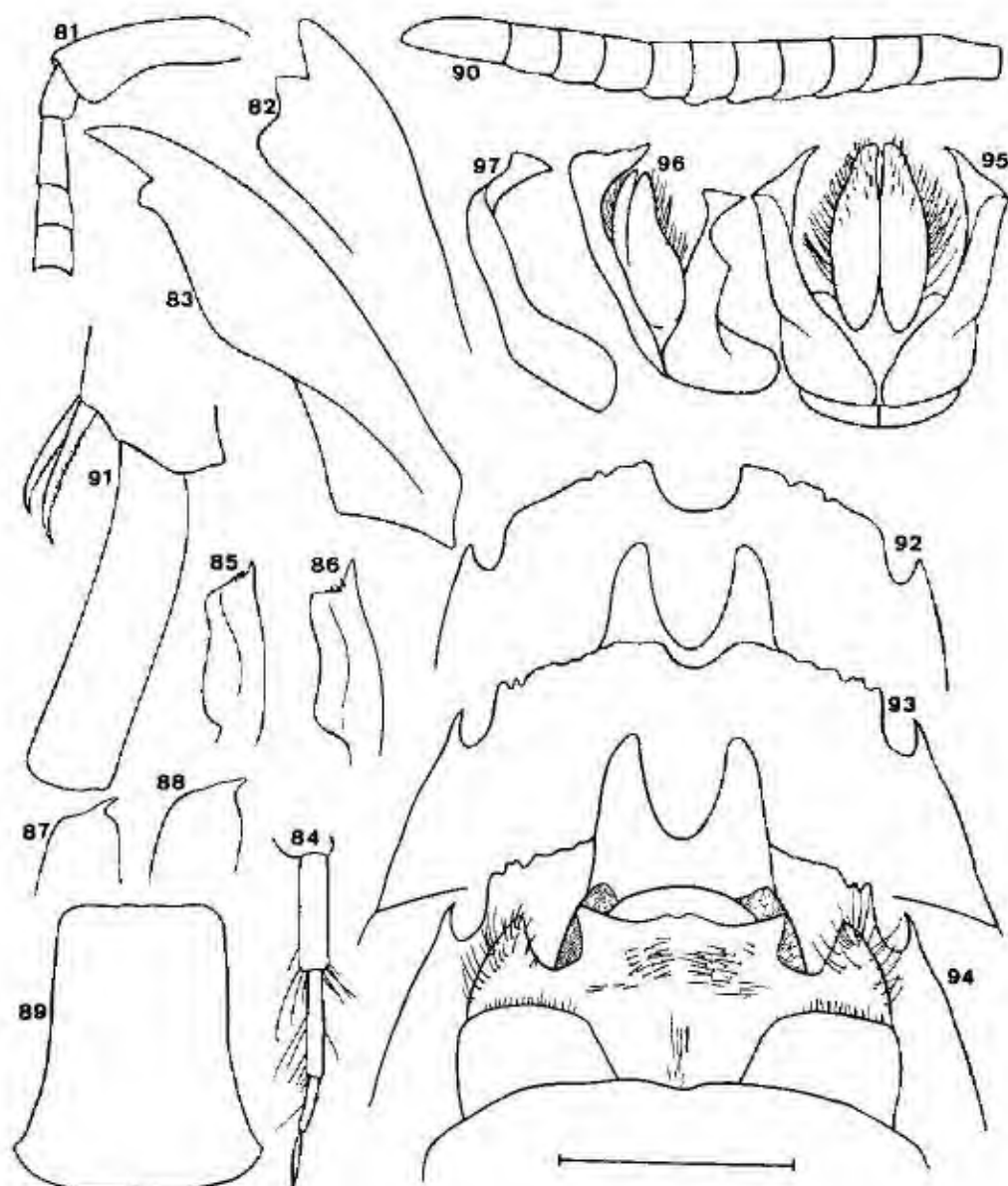
Body length ca. 11 mm, length of fore wing 7 mm.

Integument and pubescence similar to the female.

Hoplitis (Hoplitis) quettensis sp. n.

TYPE MATERIAL Holotype: Male labelled as follows: 1) "Quetta 5 04"; 2) "Col. C. G. Nurse Collection 1920–72" coll. Brit. Mus. (Hist. Nat.) London. Paratype: 1 male ditto.

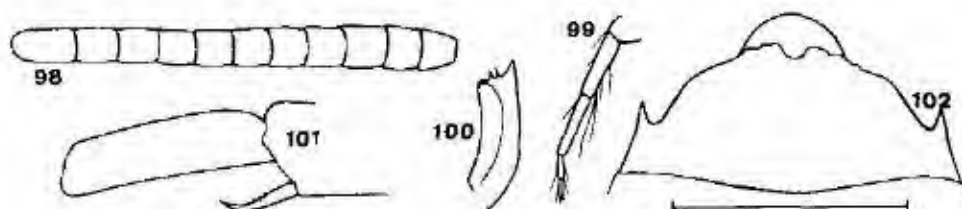
MALE Morphology Inner orbits parallelsided. Mandibles bidentate. Mouth parts of moderate length, maxillary palpi 5-segmented (Fig. 99). Segment 1 of labial palpi slightly shorter than segment 2. Upper margins of lateral ocelli touching supraorbital line. Ocelloocular distance = 350 μ m, ocellooccipital distance = 350 μ m, diameter of lateral ocellus = 160 μ m. Clypeus regularly covered with small confluent punctures (15–20 μ m) (sculpture in fresh specimens not visible, as covered with dense pubescence throughout), anterior margin straight, obtusely denticulate, lateral ca. triangular membranous processes under clypeal margin well developed. Punctuation of frontovertex regular in size, punctures relatively coarse, sharply delimited, round, only here and there feebly tending to become penta- to hexagonal, average width 30 μ m, below OOL slightly finer, these punctures separated by interspaces edgily narrow to half puncture width. Punctuation of tempora similar, being progressively finer beneath. Flagellum rectilinear, not compressed, proximal segments as in Fig. 98, segments 4–11 slightly but distinctly longer than their maximal width in frontal view, ultimate segment only a trifle longer than the penultimate one. Punctuation of mesoscutum and scutellum round, similar in size to that of vertex but shining interspaces equal to half to one puncture width. Punctuation of mesepisternum finer, more crowded than that on mesoscutum. Tegulae nearly bare, strongly shining. Propodeal triangle strongly shining except for basal transverse feebly impressed and roughened zone. Adjacent portions of propodeum strongly shining and irregularly covered with round punctures (20 μ m), spaced by half to several puncture width. Legs normally shaped. Uncus of fore tibia moderately long, spine like, slightly curved. Strigilis as in Fig. 100. Hind coxae without longitudinal carina. Hind tibial spur as in Fig. 101. Tergite 1 without gradulus except for feeble suggestion of such in a narrow median portion. Basal declivous part broadly concave in median third, with a median longitudinal stria, shining and irregularly covered with fine punctures. Sculpturing of dorsal surface of tergite 1 regular in size, punctures round (20–25 μ m), separated by



Figs 81-97. *Hoplitis (Annosmia) kaszabi*, 81 - proximal flagellar segments of right antenna, female, 82 - left mandible, female, 83 - same, male, 84 - palpus maxillaris, female, 85 - strigilis, female, 86 - same, male, 87 - apex of right fore tibia in dorsal view, female, 88 - same, male, 89 - labrum, male, 90 - flagellum of right antenna, male, 91 - apex of left hind tibia and basitarsus, male, 92 - tergite 6, male holotype, 93 - tergites 6 and 7 in dorsal view, paratype, 94 - configuration of sternites 5 and 6 and tergites 6 and 7, 95 - male genitalia in dorsal view, 96 - same in dorsolateral view, slightly from behind, 97 - left gonostypus in lateral view. Scale: Figs 84-86 = 0.5 mm, others = 1 mm.

half to one puncture width sublaterally; in median portion punctation finer and more widely spaced. Punctation of tergites 2–5 similar. Punctation of tergite 6 rather irregularly wide spaced in general, with nearly impunctate portions sublaterally and posteromedially. Shape of tergites 6 and 7 as in Fig. 102. Posterior margin of sternite 1 straight, slightly elevated in middle portion. Posterior margins of sternites 2 and 3 straight except for lateral parts feebly slanting. Posterior margins of sternites 4 and 5 under dense and long hair bands not visible. Punctation of sternites 2–5 regular (20 μ m), confluent (The genitalia could not be dissected without damaging the specimens).

Body length ca. 8 mm; length of fore wing 5 mm.



Figs 98–102. *Hoplitus (Hoplitus) quettensis*, male; 98 – flagellar segments of right antenna, 99 – palpus maxillaris, 100 – strigilis, 101 – apex of right hind tibia and basitarsus, 102 – tergites 6 and 7 in dorsal view. Scale: Figs 99, 100 = 0.5 mm, others = 1 mm

Integument: predominantly black, tending to dull reddish-brown in some places and partially lightened as follows: Mandibles in apical fourth each with semitranslucent red-brown streap. Front faces of flagellar segments ochreous, the opposite ones dark brown. Tegulae dull yellow, their basal part narrowly brownish, semitransparent. Malus of strigilis and tibial spurs pale yellow. A small dorsoapical part of pro- and mesotibiae (inclusive their unci) and a narrow stripe on apical part of outer surfaces of metatibiae lightened with ochreous. Tarsal segments of fore legs ochreous. Meso-basitarsus yellow-brown, succeeding tarsal segments ochreous. Metabasitarsus yellow-brown, succeeding tarsal segments gradually lightened with ochreous. Claws ochreous, their apical halves brownish with yellow-red tinge in some lights. Apical margin of tergite 1 feebly impressed, apical margins of tergites 2–5 with dull yellow borders, gradually becoming broader and paler toward metasoma apex. Median preapical area of tergite 6 reddish-brown, its apical margin inclusive of lateral teeth pale yellow and semitranslucent; apical area of tergite 7 of the same colour. Lateroapical portion of sternite 1 and a rather broad preapical margin of sternites 2–5 reddish-brown to yellowish. – Fore wing membrane evenly hyaline throughout (Without darkened stripe in marginal cell). Venation in basal third of fore wing pale ochreous, only subcosta just behind its basis brownish. Stigma and remainder of venation darker, yellowish-brown, semitranslucent.

Pubescence: Generally greyish-white (due to the fact that both specimens are much worn with pubescence apparently faded and largely rubbed off its original coloration may be having a more or less yellowish tint at least on vertex and thoracic dorsum). Clypeus, paraclypeal areas and frons densely covered with pubescence entirely concealing the surface; long hairs on clypeus arranged radiately from posterior portion and greatly overreaching its anterior margin; shorter appressed hairs on supraclypeal area and longer ones on frons directed backwards. Basal portion of dorsal surfaces of mandibles with short, nearly appressed white pubescence. Dorsal surfaces of hind tibiae with very dense appressed white pubescence concealing the ground. Apical margins of tergites 1–

5 with dense appressed white hairs bands. Apical margins of sternites 1-5 fringed with appressed white hair bands increasing in density and width toward metasoma apex.

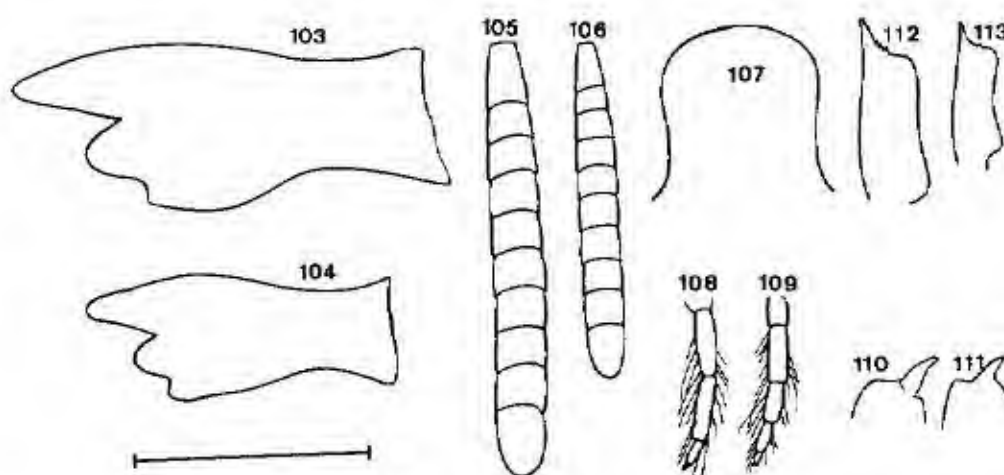
The following two new intimately allied species at a casual glance very similar to each other constitute a little species group within the subgenus *Hoplitis* s. str., sharply delimited from all their relatives known as yet by the greatly modified hind legs in the male sex.

***Hoplitis (Hoplitis) monstrabilis* sp. n.**

TYPE MATERIAL. Holotype: Male (a fresh specimen) from E. Turkey labelled "Erzurum 12 VI 1970 H. Ozbek", coll. Ozbek. Paratypes: 1 female labelled as holotype, coll. of the author, Erzurum 13.7.1972, 1 female, Ozbek lgt (sent to the author by Mr. G. van der Zanden on loan), 23.6.1974, 1 female, 26.6.1974, 1 female, lgt. et coll. Ozbek "Prov. Elazig, N. u. E-Ufer d. Hazar Golu 38° 30', 39° 24', 1 VI 1985", 1 female, Aspöck & Rausch lgt (sent to the author by Mr. G. van der Zanden on loan).

***Hoplitis (Hoplitis) erzurumensis* sp. n.**

TYPE MATERIAL. Holotype: Male (a nearly fresh specimen) from E. Turkey labelled "Erzurum 17.VI-1970 H. Ozbek", coll. Ozbek. Paratypes: Erzurum, 12.6.1970, 1 female, coll. of the author, 16.6.1970, 1 male, 17.6.1970, 1 female, coll. Nat. Mus. Prague, 30.6.1970, 1 male, coll. v. d. Zanden 2.7.1970, 2 females, coll. of the author 9.7.1970, 2 females, 10.7.1970, 1 female, 12.7.1970, 2 females, 1 male, 24.7.1970, 2 females, 29.7.1970, 1 female, 6.7.1971, 1 female, coll. of the author, 15.7.1971, 1 female, 20.7.1971, 4 females, 27.6.1972, 1 female, coll. of the author, 2.7.1972, 1 female, 13.7.1972, 1 female, 1 male, male coll. of the author, 17.6.1974, 1 female, 20.6.1974, 1 female, coll. of the author, 25.6.1974, 1 female, 24.6.1974, 1 female, if not otherwise indicated, all paratypes lgt. et coll. Ozbek. Nevsehir, 10 km S. Avanos. Goreme, 1000 m, 22.6.1987, 1 male, R. Hensen lgt., coll. Zanden.

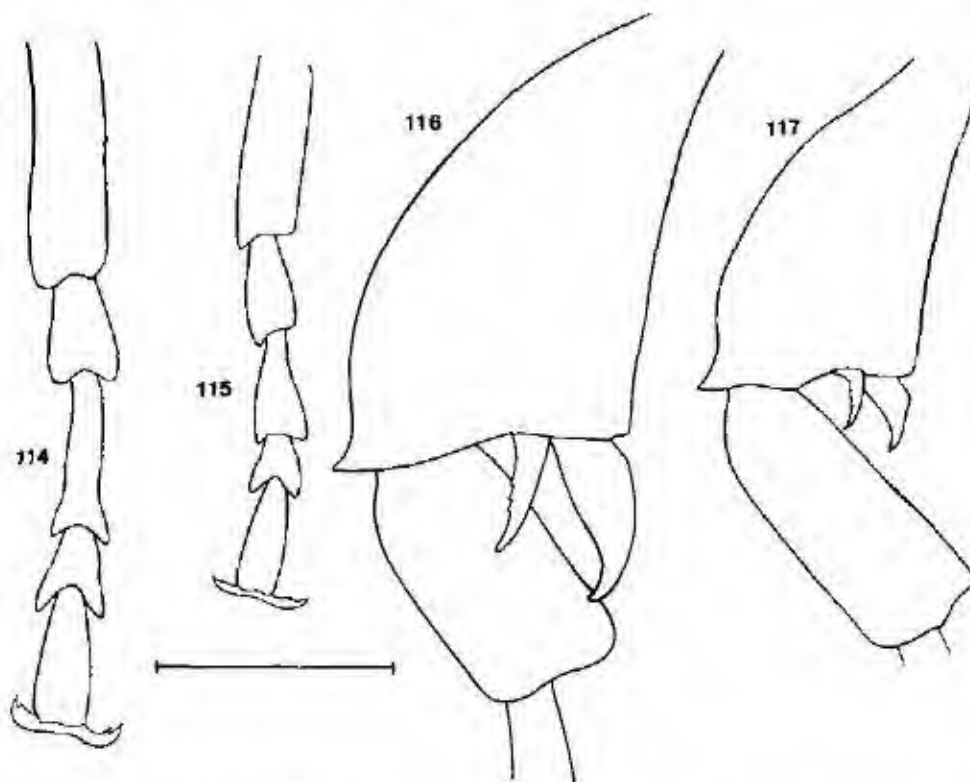


Figs 103-113. Figs 103, 104 - right female mandible, 103 - *Hoplitis (Hoplitis) monstrabilis*, 104 - *H. (Hoplitis) erzurumensis*. Figs 105, 106 - flagellar segments of right female antenna, 105 - *H. monstrabilis*, 106 - *H. erzurumensis*, 107 - *H. erzurumensis*, female labrum. Figs 108, 109 - palpus maxillaris, females, 108 - *H. monstrabilis*, 109 - *H. erzurumensis*, 110-111. Apex of right fore female tibia in dorsal view, 110 - *H. monstrabilis*, 111 - *H. erzurumensis*. Figs 112, 113. Stegula, females, 112 - *H. monstrabilis*, 113 - *H. erzurumensis*. Scale Figs 108, 109, 112, 113 = 0.5 mm, others = 1 mm.

NOTE. "*Hoplitis erzurumensis* Tkalcu" introduced by Özbek (1979: 101) is *nomen nudum*.

Characters common in both species:

FEEMALES. Morphology: Inner orbits parallel sided. Mandibles tridentate (Figs 103, 104). Labrum quadrate. Mouth parts relatively short; maxillary palpi short, 5-segmented (Figs 108, 109), segment 1 of labial palpi slightly shorter than segment 2. Upper margins of lateral ocelli imperceptibly below

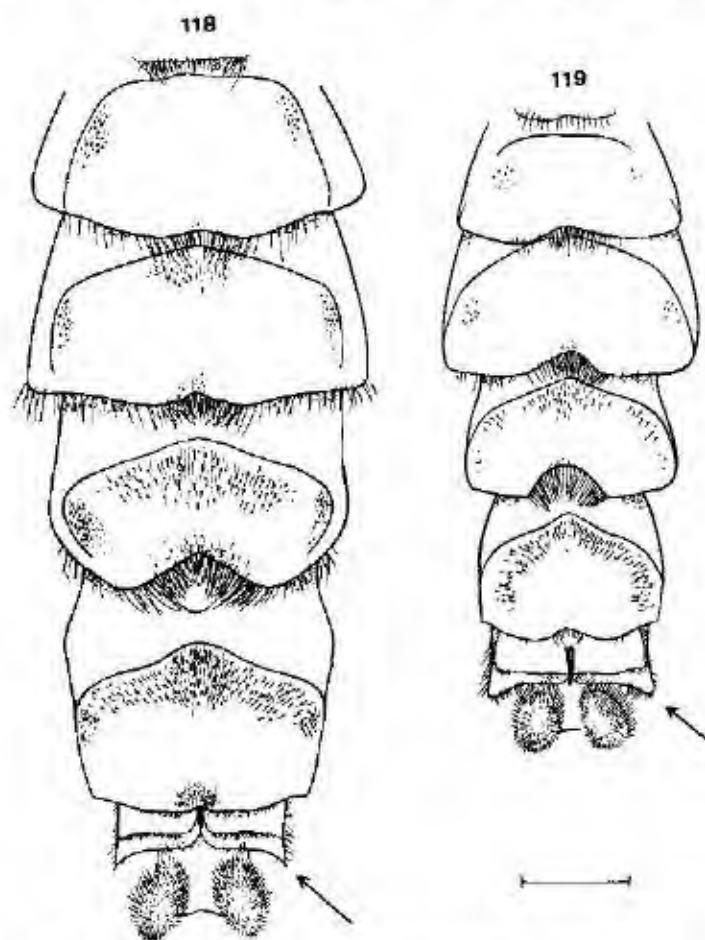


Figs 114-117. Figs 114, 115 - tarsal segments of left mid leg of males, 114 - *H. monstrabilis*, 115 - *H. erzurumensis*. Figs 116, 117 - tibia and basitarsus of right hind leg of males in outer view; 116 - *H. monstrabilis*, 117 - *H. erzurumensis*. Scale = 1 mm.

supraorbital line. Clypeus feebly convex except for lateral corners, densely punctate, with narrow polished interspaces; in middle a narrow longitudinal impunctate line irregularly delimited, tapering and slightly elevated anteriorly. Anterior clypeal margin straight, obtusely denticulate; lateral ca. triangular membranous processes under clypeal margin well developed. Frontovortex and mesoscutum covered with round punctures, interspaces somewhat irregular, edgily narrow to one puncture width, polished. Punctuation of scutellum slightly finer, more confluent, with very narrow interspaces and a narrow impunctate line on anterior half. Tegulae polished, nearly impunctate. Propodeal triangle polished except for basal transverse, finely roughened zone. Adjacent portion

of propodeum with fine round punctures, irregularly separated by several puncture width in some places. Uncus of fore tibia moderately long, spine like, slightly curved (Figs 110, 111). Strigilis as in Figs 112, 113. Hind coxae without ventral longitudinal carina. Tergite 1 with obtuse gradulus disappearing laterally, its ventrobasal portion with a long, well developed stria; basal declivous zone shining, with a longitudinal median sulcus, only at sided sparsely and finely punctate. Tergites 1-5 shiny, punctation finer than that on mesoscutum, but progressively becoming coarser and more crowded toward apex of metasoma.

Integument: Black. Transverse subapical portions of mandibles reddish-brown. Frontal surface of flagellum ochreous except for terminal segment which is brown; hind surface of flagellum darker. Tegulae yellow, translucent. Fore wing membrane hyaline. Venation brown. Nervulus interstitial. Cubital cell 1 approximately as large as cubital cell 2. Proximal abscissa of cubital cell 2 distinctly longer than the distal one. Unci of pro- and mesotibiae ochreous, tending to reddish toward apex. Tibial spurs brownish-yellow. Tarsal segments 2-5 brownish yellow; pulvilli dark brown.



Figs 118, 119. Sternites of males: 118 - *H. monstrabilis*, 119 - *H. erzurumensis*. Scale = 1 mm.

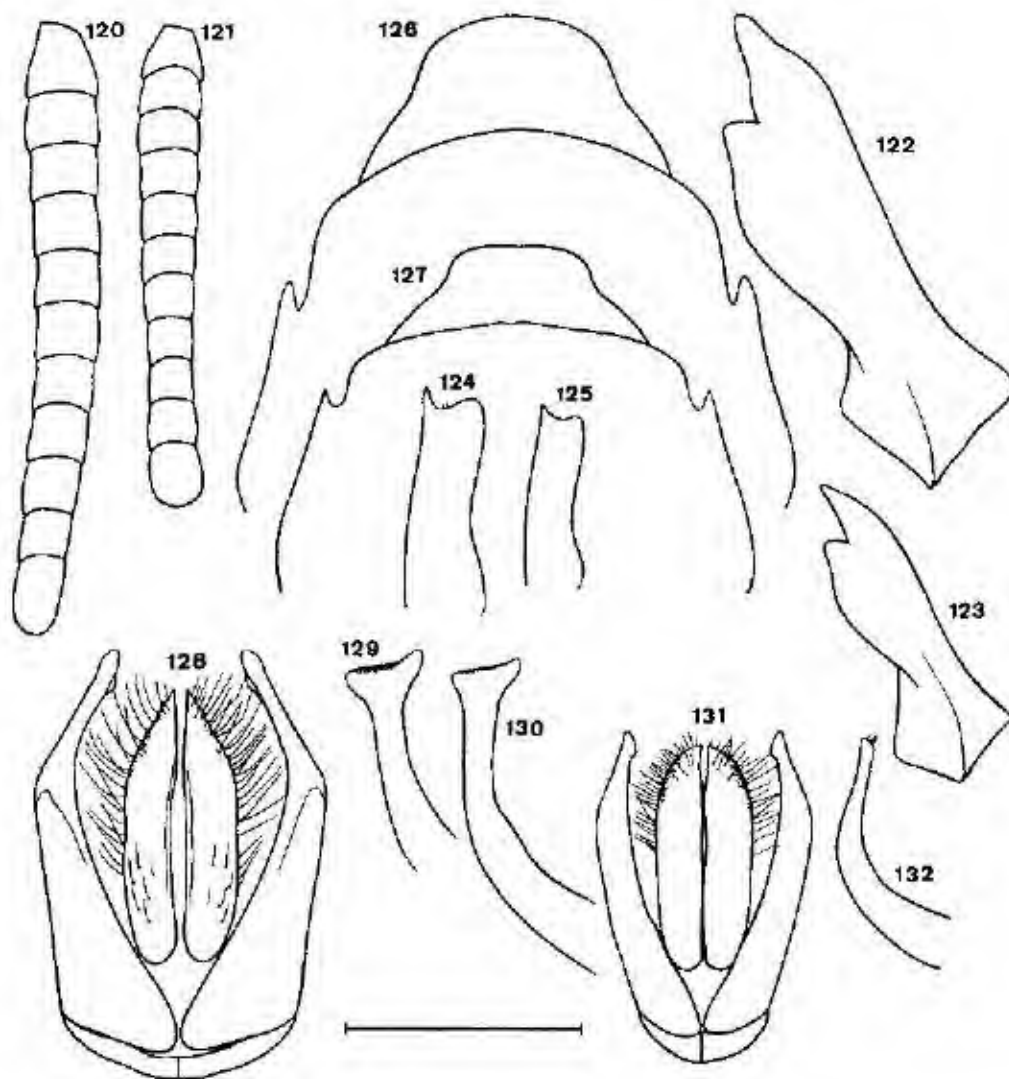
Pubescence: Moderately long, predominantly semierect to erect, greyish-white. Clypeus with hairs dull yellowish concealing the surface except for mediobasal ca. triangular area. Bristles arising under clypeal margin light honey yellow. Dorsal surfaces of mandibles with dense, nearly appressed pubescence, whitish on basal third, tending to pale yellow on middle third; a broad apical margin bare. Outer surfaces of hind tibiae with only sparse pubescence leaving the surface well visible; dorsal surfaces with very dense appressed whitish pubescence completely concealing the ground. Inner surfaces of all basitarsi light honey yellow. Erect hairs of tergite 1 distinctly longer than those on tergites 2–5. Apical margins of tergites 1–5 with dense appressed whitish hair bands having anterior limits sharp; bands on tergites 1 and 2 slightly narrower than on remaining tergites. Tergite 6 densely covered with very short appressed greyish hairs, integument still well visible in some lights. Scopa hairs rather dense, relatively short, semiappressed, pale greyish, tending to white to pale yellow in some lights.

MALES. Morphology: Inner orbits distinctly diverging below. Mandibles bidentate (Figs 122, 123). Labrum slightly longer than its width at base. Mouth parts as in female. Upper margins of lateral ocelli situated slightly below supraorbital line. Clypeus regularly covered with small confluent punctures, surface dull (sculpture in fresh specimens not visible, as covered with dense pubescence throughout); anterior margin straight, obtusely denticulate, lateral ca. triangular membranous processes under clypeal margin well developed. Flagelli slightly compressed. Sculpture of head and thorax similar to that of female. Hind tibiae greatly inflated (Figs 116, 117), tibial spurs (especially the inner ones) modified. Tergites more finely punctate than in female. Sternites as in Figs 118, 119.

Integument: Black. Transverse subapical portion of mandibles reddish-brown. Flagelli pale ochreous except for darkened ultimate segment; their hind faces with diffuse brownish patches on segments 1–6. Tegulae, fore wings and legs as in female. Hind tibial spurs yellowish-brown, dark brown apically.

Pubescence: Clypeus, paraclypeal and supraclypeal areas and frons very densely covered with pale ochreous pubescence entirely concealing the surface; long hairs on clypeus arranged radiately from posterior portion, greatly overreaching anterior margin; shorter hairs on paraclypeal areas directed sideways, shorter appressed hairs on supraclypeal area and longer ones of frons directed backwards. Vertex with loose erect pale ochreous pubescence becoming denser near occiput; tempora with shorter dull yellowish pubescence fading into pure white on their lower portions and genal areas. Basal portions of dorsal surfaces of mandibles with short, nearly appressed whitish pubescence; outer margins of mandibles on basal halves with whitish erect hairs. Thorax with moderately long, predominantly erect ochreous pubescence becoming denser especially in front of mesoscutum, along tegulae and on hind margin of scutellum and fading into whitish on lower parts of mesepisternum; underside of thorax covered with shorter, very dense appressed pure white pubescence directed backwards and entirely concealing the surface. Hairs of legs whitish, inner surfaces of basitarsi pale ochreous. Erect to semierect pubescence of tergites 1–7 dull ochreous, tending to become sooty toward metasoma apex; hairs of tergite 1 distinctly longer than those on tergites 2–7. Apical hair bands on tergites 1–5 similar to those of females. Tergite 6 lacking a distinct apical hair band. Apical margins of sternites 1–3 and midapical incision of sternites 4 fringed with dense appressed white hair bands.

The difference between the two species:



Figs 120-132 Figs 120, 121 - flagellar segments of right antenna of males, 120 - *H. monstrabilis*, 121 - *H. erzurumensis*. Figs 122, 123 - right male mandible, 122 - *H. monstrabilis*, 123 - *H. erzurumensis*. Figs 124, 125 - strigulae of males, 124 - *H. monstrabilis*, 125 - *H. erzurumensis*. Figs 126, 127 - tergites 6 and 7 of males in dorsal view, 126 - *H. monstrabilis*, 127 - *H. erzurumensis*. Figs 128-130 - male genitalia of *H. monstrabilis*, 128 - in dorsal view, 129 - left gonostypus in dorsolateral view, slightly from behind, 130 - left gonostypus in lateral view. Figs 131, 132 - male genitalia of *H. erzurumensis*, 131 - in dorsal view, 132 - in lateral view. Scale: Figs 124, 125 = 0.5 mm, others = 1 mm.

<i>H. monstrabilis</i> sp. n.	<i>H. erzurumensis</i> sp. n.
Females	
Ratios of width of tempora and width of eye as 58:62	Ratios of width of tempora and width of eye as 38:62
Ocelluloocular distance = 640 μ m	Ocelluloocular distance = 480 μ m
Ocellulooccipital distance = 930 μ m	Ocellulooccipital distance = 640 μ m
Punctuation of supraclypeal area confluent and a little finer, distinctly so than that of adjacent basal part of clypeus	Punctuation of supraclypeal area less crowded and somewhat irregular, quite similar in size to that of adjacent basal part of clypeus
Punctuation of area in front of ocelli confluent with interspaces edgily narrow	Punctuation of area in front of ocelli less crowded with narrow but distinct polished interspaces
Flagellar segment I (Fig. 105) relatively longer	Flagellar segment I (Fig. 106) relatively shorter
Erect hairs on tergites 2–5 relatively longer	Erect hairs on tergites 2–5 relatively shorter
Body length ca. 12 mm, length of fore wing 10 mm	Body length ca. 10 mm, length of fore wing 6 mm
Males	
Ratios of width of tempora and width of eye as 65:80	Ratios of width of tempora and width of eye as 42:70
Flagellar segment I (Fig. 120) relatively longer	Flagellar segment I (Fig. 121) relatively shorter
Flagellum slightly tapering toward apex, maximal width in segment I in frontal view	Flagellum parallel sided in frontal view
Tarsal segments of mid leg as in Fig. 114	Tarsal segments of mid leg as in Fig. 115
Metatibia and metabasitarsus as in Fig. 116	Metatibia and metabasitarsus as in Fig. 117
Inner surfaces of metathoracic with a few irregularly scattered punctures	Inner surfaces of metathoracic with widely spaced punctuation
Punctuation of sternite 2 relatively coarser and regular, interspaces on broad sublateral portions hardly exceeding 2 puncture width	Punctuation of sternite 2 relatively finer and irregular interspaces on broad sublateral portion to several puncture width
Distolateral corner of sternite 6 sharply pointed (Fig. 118)	Distolateral corner of sternite 6 wider, with rectangled sides (Fig. 119)
Genitalia as in Figs 128–130	Genitalia as in Figs 131–132
Body length ca. 13 mm, length of fore wing 9 mm	Body length ca. 11 mm, length of fore wing 6.5 mm
Hind surface of flagellar segment I sooty brown except for ochreous lower border	Nearly whole hind surface of flagellar segment I sooty brown
Hind surfaces of flagellar segments 2–4 diffusely sooty brown at upper border, these darkened patches gradually becoming smaller and less conspicuous distally	The shallow concavity of hind surfaces of flagellar segments 2–6 sooty brown, these darkened patches gradually becoming less conspicuous distally

H. erzurumensis sp. n. is closely allied to *Hophtis lapidaria* (Morawitz, 1878) and differs from it in the female sex as follows:

<i>H. lapidaria</i> (Morawitz)	<i>H. erzurumensis</i> sp. n.
Segments 2 and 3 of maxillary palpi a little longer	Segments 2 and 3 of maxillary palpi a little shorter (Fig. 109)
Punctuation of frontovertex more crowded, nearly confluent and tending to be penta- to hexagonal on ocelluloocular area, with interspaces mostly edgily narrow	Punctuation of frontovertex less crowded, punctures round separated by wider shining interspaces to one puncture width
Ocelluloocular distance = 640 μ m	Ocelluloocular distance = 480 μ m
Ocellulooccipital distance = 465 μ m	Ocellulooccipital distance = 640 μ m
Propodeal triangle shagreened throughout though rather shining	Propodeal triangle polished except for basal transverse finely roughened zone
Punctuation of median portions of tergites 1 and 2 regular, crowded, interspaces edgily narrow to one puncture width	Punctuation of median portions of tergites 1 and 2 somewhat irregular and less crowded, interspaces to 2 to 3 puncture width
Flagelli dark reddish-brown	Frontal faces of flagelli ochreous except for basal and terminal segments
Broad apical margins of tergites 1–5 (affaced normally by apical hair bands) markedly lightened with brownish-yellow	Apical margins of tergites 1–5 dark, only along apical marginal edges with narrow, mostly imperceptible dark reddish-brown belts
Apical hair bands of tergites 1–5 distinctly wider (width on median part of tergite 4 = 310 μ m)	Apical hair bands of tergites 1–5 distinctly narrower (width on median part of tergite 4 = 225 μ m)
Short recumbent hairs of tergite 6 richly short-branched	Short recumbent hairs of tergite 6 bristle-like simple

Lectotype of *Osmia lapidaria* Mor (examined in 1994). Female labelled: 1) a small round label with golden surface (marking the type-material), 2) written by Morawitz in Chinese ink "Eriwan", 3) written by Morawitz in Chinese ink "*lapidaria*", 4) red label, written by Warncke in Chinese ink "Lectotypus *Osmia lapidaria* Mor female (Warncke 1984)", 5) yellow label, black printed "Zool Inst St Petersburg". Condition good, only right flagellum missing, median portion of hair bands on tergites 1, 3 and 4 partially, that on tergite 2 completely glued together.

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